AN EXAMINATION OF THE USDA HEMP PRODUCTION PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON
BIOTECHNOLOGY, HORTICULTURE, AND RESEARCH

OF THE

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CONTENTS

WITNESSES

AN EXAMINATION OF THE USDA HEMP PRODUCTION PROGRAM

THURSDAY, JULY 28, 2022

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON BIOTECHNOLOGY, HORTICULTURE, AND RESEARCH,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 1300 of the Longworth House Office Building, Hon. Stacey E. Plaskett [Chair of the Subcommittee] presiding.

Members present: Representatives Plaskett, Brown, Schrier, Pingree, Carbajal, Lawson, Harder, Baird, and Thompson (*ex officio*).

Staff present: Lyron Blum-Evitts, Ellis Collier, Malikha Daniels, Amar Nair, Ricki Schroeder, Patricia Straughn, Erin Wilson, and Dana Sandman.

OPENING STATEMENT OF HON. STACEY E. PLASKETT, A DELEGATE IN CONGRESS FROM VIRGIN ISLANDS

The CHAIR. This hearing of the Subcommittee on Biotechnology, Horticulture, and Research entitled, *An Examination of the USDA Hemp Production Program,* will come to order.

Welcome, and thank you for joining today's hearing. After brief opening remarks, Members will receive testimony from our witnesses today, and then the hearing will open for questioning. I want to thank my colleagues and our witnesses for joining me today as we host this important discussion on hemp and the USDA Hemp Production Program.

Today, we will hear from a panel of experts, including producers, researchers, Tribal members, and State Agriculture Commissioners, who will provide an overview of the hemp industry and insights towards the 2023 Farm Bill.

Until recently, the hemp industry was outlawed due to restrictions put in place in the Marijuana Tax Act of 1937 (Pub. L. 75–238). And hemp was treated no differently than marijuana under the Controlled Substances Act (Pub. L. 91–513). In 2014, the farm bill removed longstanding Federal restrictions on the cultivation and production of hemp, allowing more State Departments of Agriculture and institutions of higher learning to produce this crop as part of a pilot program for research purposes.

In the 2018 Farm Bill, Congress authorized commercial production of hemp and directed USDA to establish the U.S. Domestic Hemp Production Program, giving USDA the responsibility of culti-

vating and approving plans submitted to states, Territories, or Tribal authorities who wish to regulate hemp production.

In January of 2021, USDA issued its final ruling on regulating the production of hemp in the United States. Feedback from public comments, as well as lessons learned from previous growing seasons, helped influence regulations established on the interim final rule published in October of 2019.

USDA continues to conduct research and outreach to help support the burgeoning hemp sector. In my home district of the U.S. Virgin Islands, small and local hemp producers have already taken advantage of the program to provide a new source of revenue for their farms and additional jobs to their community. With the guidance of the USDA, the Virgin Islands has the potential to begin a new economic era that will benefit the government, local farmers, and local business entrepreneurs.

The production of hemp has created value for producers and consumers, over $800 million in 2021, with over 55,000 acres of hemp planted. While markets for hemp products such as fiber, grain, and flour are developing, they are still volatile and uncertain. To support farmers and producers in the ongoing development of this reemerging sector, it is crucial that USDA continue to work to support and expand hemp production and the hemp industry.

As we look towards the next farm bill, we can continue to address ongoing issues and provide our farmers, producers, processors, and agricultural researchers with the resources they need. This hearing is an opportunity for us to hear what we can do to ensure the continued growth and development of this resurging crop.

[The prepared statement of Ms. Plaskett follows:]

PREPARED STATEMENT OF HON. STACEY E. PLASKETT, A DELEGATE IN CONGRESS FROM VIRGIN ISLANDS

Good morning and thank you to my colleagues and our witnesses for joining me today as we host this important discussion on hemp and the USDA Hemp Production Program. Today, we will hear from a panel of experts including producers, researchers, Tribal members, and State Agriculture Directors and Commissioners who will provide an overview of the hemp industry and insight toward the 2023 Farm Bill.

Until recently, the hemp industry was outlawed due to restrictions put in place by the Marijuana Tax Act of 1937, and hemp was treated no differently than marijuana under the Controlled Substances Act.

In 2014, the farm bill removed long-standing Federal restrictions on the cultivation and production of hemp, allowing state departments of agriculture and institutions of higher learning to produce this crop as part of a pilot program for research purposes.

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era that will benefit the government, our local farmers, and local business entrepreneurs through economic and growth opportunities.

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As we look toward the next farm bill, we can continue to address ongoing issues and provide our farmers, producers, processors, and agricultural researchers with the resources they need. This hearing is an opportunity for us to hear what we can do to ensure the continued growth and development of this resurging crop.

The CHAIR. I would now like to welcome the distinguished Ranking Member, the gentleman from Indiana, Mr. Baird, for any opening remarks he would like to give.

OPENING STATEMENT OF HON. JAMES R. BAIRD, A REPRESENTATIVE IN CONGRESS FROM INDIANA

Mr. BAIRD. Well, good morning. And I want to thank you, Chair Plaskett, for holding this session and this hearing, and I really appreciate the witnesses that are here today and you giving your time to really help us understand what is going on in the hemp industry and to update us.

I also think it is noteworthy to mention that this is really the first hearing that the House Committee on Agriculture has held on hemp ever.

The CHAIR. Yes.

Mr. BAIRD. So, mind you, the 2014 Farm Bill authorized the Hemp Research Pilot Program, and then the 2018 Farm Bill subsequently legalized hemp production at the Federal level. And to say this is important is an understatement. So I am pleased we have a well-rounded stakeholder panel here today with representatives from the hemp industry, including two state regulators, a Tribal representative, a researcher, and a company that manufactures hemp products.

That said, I do believe it is a missed opportunity that we don't hear from the Federal agencies that we have tasked, and they are tasked, with implementing provisions related to hemp today. So, Madam Chair, I remain hopeful that we can have an opportunity to hear from both the USDA and the FDA at one of our future meetings.

As the hemp industry rapidly expanded following the passage of the 2018 Farm Bill, a wave of innovation followed. And as researchers and companies started identifying uses for hemp fiber, including building materials, insulation, animal bedding, concrete, and even car parts, this is one of my areas of interest, and I look forward to hearing more about that today.

This rapid expansion of the hemp industry also led to increased interest and research around the use of hemp in animal feed. Given my background in animal science and monogastric nutrition, I look forward to hearing more about this research, including whether it has been tested and what is on the horizon for that kind of a product.

And even though the legalization of hemp has spurred innovation in the use of hemp fiber and grain, we are seeing much of the hemp grown in the United States used to manufacture hemp-de-

rived CBD. Since the passage of the 2018 Farm Bill, there has been no regulatory framework from the Food and Drug Administration for CBD products, leading to some uncertainty for producers, for manufacturers, retailers and as well as consumers.

While we are certain to hear about successes in the hemp industry, it is important to note that we have many challenges, leading to a significant decline in the number of hemp acres planted since 2019. And as we discuss potential areas for change in the 2023 Farm Bill, it is critical that we comprehensively understand these challenges to ensure our policies benefit producers and consumers alike.

Again, I would like to thank the witnesses for taking the time to be with us here today, and I look forward to hearing more about the work they are doing within the hemp industry. And with that, I yield back.

The CHAIR. Thank you so much to the Ranking Member of the Subcommittee for your tireless efforts to support farmers and to be such an incredible colleague on this Subcommittee.

The chair would request that other Members submit their opening statements for the record so witnesses may begin their testimony and ensure that there is ample time for questioning.

[The prepared statement of Ms. Brown follows:]

PREPARED STATEMENT OF HON. SHONTEL M. BROWN, A REPRESENTATIVE IN CONGRESS FROM OHIO

Thank you Chair Plaskett.

I am pleased we are joined today by Central State University Assistant Professor Dr. Brandy E. Phipps, whose research in my home State of Ohio has informed farmers and researchers on the benefits of hemp cultivation.

Dr. Phipps is currently utilizing 20+ years of comprehensive research experience to identify ways hemp might provide the aquaculture industry with a cost-effective, sustainable alternative to fish oil and meal.

We thank her for her time today and her work to better discern industrial hemp cultivation.

The CHAIR. I am pleased to welcome five outstanding witnesses to the Subcommittee today. Our witnesses bring to our hearing a wide range of experience and expertise, and I thank you for joining. Our first witness will be Dr. Brandy Phipps, Ph.D., Assistant Professor, Department of Agricultural and Life Sciences, Central State University, Cedarville, Ohio. Our second witness today is Mr. Marcus Grignon, the Executive Director of the Hempstead Project Heart in Green Bay, Wisconsin. Third witness is Mr. Eric Wang, the Chief Executive Officer of Ecofibre. He is testifying today on behalf of the U.S. Hemp Roundtable. Also, Dr. Ryan F. Quarles, who is the Commissioner of Kentucky Department of Agriculture. And our fifth and final witness is Ms. Kate Greenberg, who is the Commissioner of the Colorado Department of Agriculture.

Welcome to you all today. We will now proceed to hearing your testimony. You will each will have 5 minutes, and the timer should be visible to you and will count down to zero, at which point your time has expired.

Dr. Phipps, please begin when you are ready.

STATEMENT OF BRANDY E. PHIPPS, PH.D., ASSISTANT PROFESSOR, DEPARTMENT OF AGRICULTURAL AND LIFE SCIENCES, CENTRAL STATE UNIVERSITY, WILBERFORCE, OH

Dr. PHIPPS. Chair Plaskett, thank you for the invitation and opportunity to speak to the Biotechnology, Horticulture, and Research Subcommittee of the House Committee on Agriculture.

Central State University, where I am faculty is in Ohio District 10 represented by Congressperson Mike Turner. Central State is a public historically Black college and university and an 1890 land-grant institution. As such, I want to acknowledge the two Ohio Representatives of this Subcommittee, Representatives Brown and Balderson, and Chairperson Scott of the House Committee on Agriculture, who has been a consistent champion of the 1890 land-grant institutions.

Chair Plaskett and the Members of this Subcommittee, I want to thank you for continuing to include the 1890 voice in the work that you do in this Committee. And finally, I would like to acknowledge the professional staff of this Committee who have been excellent to work with this past week.

I am Brandy Phipps, Assistant Professor in the Department of Agricultural and Life Sciences and a researcher in the Food, Nutrition, and Health project of the Agriculture Research and Development Program at Central State University. My background is in biomedical and nutritional sciences, and my work is in what others have coined *sustainable nutrition science* or the intersection of food systems transformation, sustainability, nutrition, and health equity. I tend to partner with other researchers and community leaders across disciplines to find holistic solutions to complex problems related to human health and quality of life. For example, how do we equitably feed a growing population in ways that protect natural resources and contribute to a sustainable and a resilient economy?

To that end, my work with hemp fits nicely within those goals, and I have focused primarily on its nutritional and nutraceutical value for humans. This includes an ongoing $1.3 million contract with the U.S. Food and Drug Administration with Dr. Craig Schluttenhofer, where we evaluate the chemical constituents of smoked and vaped hemp products. I also serve as project director for a $10 million, 5 year sustainable agriculture systems project funded by the U.S. Department of Agriculture's NIFA and referred to as the SUSHI Project.

With the continued rise of chronic diet-related conditions like cardiovascular disease and type II diabetes in the United States, strategies to produce and increase the intake of heart-healthy foods such as hemp grain and fish are critical to slow the rise of chronic disease in our country. Concurrently, in order to become a stable component of the agricultural economy, the nascent U.S. hemp market needs diversification and a robust establishment of the grain sector. The SUSHI Project addresses both needs as it investigates the use of hemp grain as a feed ingredient for aquaculture systems.

Hemp grain has the potential to be an excellent domestic feed ingredient for many types of livestock. It is nutrient-dense, with seeds either consumed whole or dehulled as hearts. Hemp hearts

have a healthy balance of omega-6 to omega-3 fatty acids, which are known as heart-healthy and easily digestible protein, and it is one of the few plant protein sources with sufficient levels of all the essential amino acids that humans need.

In Europe, hemp grain is already approved for use in animal feeds. And in the U.S., the hearts, protein, and seed oil have been established as generally regarded as safe, or GRAS, for human consumption. Exploring ways in which we can open up additional markets in the hemp sector, including establishing hemp as a safe feed ingredient, could provide new grain markets for the hemp sector and sustainable feed. Importantly, studies indicate that incorporation of hemp into feeds may provide key improvements to the nutritional profile of those animal products, thereby enhancing human health.

In addition to what I present here today and what has been submitted in my written testimony, Dr. Schluttenhofer and I recently published, *Perspectives of Industrial Hemp Cultivation,* a chapter in the book, INDUSTRIAL HEMP: FOOD AND NUTRACEUTICAL APPLICATIONS, which overviews the status of the hemp industry in the U.S. and across the globe.

Thank you again for the opportunity to participate in this important discussion.

[The prepared statement of Dr. Phipps follows:]

PREPARED STATEMENT OF BRANDY E. PHIPPS, PH.D., ASSISTANT PROFESSOR, DEPARTMENT OF AGRICULTURAL AND LIFE SCIENCES, CENTRAL STATE UNIVERSITY, WILBERFORCE, OH

Chair Plaskett, thank you for the invitation and opportunity to speak to the Biotechnology, Horticulture, and Research Subcommittee of the House Committee on Agriculture. Central State University (CSU), where I am faculty, is in Ohio District 10, represented by Congressperson Mike Turner. CSU is a public Historically Black College/University (HBCU) and an 1890 Land-Grant Institution. I want to acknowledge the two Ohio Representatives on this Subcommittee, Representatives Brown and Balderson and Chairperson Scott of the House Committee on Agriculture who has been a consistent champion for the 1890 Land-Grant Institutions.

I am an Assistant Professor in the Department of Agricultural and Life Sciences and a researcher in the Food, Nutrition, and Health project of the Agriculture Research and Development Program at Central State University. My background is in Biomedical and Nutrition Sciences, so my work with hemp has primarily focused on its nutritional and nutraceutical value for humans. This includes an ongoing $1.3 million contract with the U.S. Food and Drug Administration (FDA) with Dr. Craig Schluttenhofer evaluating the chemical constituents of smoked and vaped hemp products and serving as Project Director for a $10 million, 5 year Sustainable Agricultural Systems project, funded by the U.S. Department of Agriculture's National Institutes of Food and Agriculture and referred to as the SUSHI project (**S**ustainable **U**se of a **S**afe **H**emp **I**ngredient). The SUSHI project investigates the use of hemp as an animal feed ingredient to improve human health and economic prosperity—promoting the production of sustainable, safe, affordable, and accessible sources of high-value, nutrient-dense foods—focusing on rural, low-income, and underrepresented minorities (URM). This project has team members from all three types of Land-Grant Institutions:

- Central State University, Lead Institution (1890 Land-Grant Institution):
  - Brandy E. Phipps, Ph.D.—Biomedical and Nutrition Sciences and Community-Centered Food Sovereignty
  - Craig Schluttenhofer, Ph.D.—Agronomy, Biochemistry, Breeding, Genetics, and Processing of Hemp
  - KrishnaKumar Nedunuri, Ph.D.—Water Resources Management and Environmental Engineering
- Kentucky State University (1890 Land-Grant Institution):

- Waldemar Rossi, Ph.D.—Fish Nutrition and Aquaculture

- College of Menominee Nation (1994 Land-Grant Institution):
  - Brian Kowalkowski, M.S.—Community Data Analysis, Cooperative Extension/Outreach, and Tribal Government Liaison and Grant Management

- University of Kentucky (1862 Land-Grant Institution):
  - Tyler Mark, Ph.D.—Agriculture Production Economics and Hemp Economics

- University of Delaware (1862 Land-Grant Institution):
  - Brandon McFadden, Ph.D.—Applied Economics and Statistics and Consumer Demand and Preferences for Hemp

- Mississippi State University (1862 Land-Grant Institution):
  - Seong Yun, Ph.D.—Resource and Environmental Economics

Figure 1. Project summary graphic representing inputs and long-term outcomes

While currently in the early stages, the SUSHI project is expected to (1) support the use of hemp as a safe feed ingredient, leading to approval as an economically and environmentally sustainable fish feedstuff; (2) expand domestic markets for hemp and trout; (3) increase workforce diversity in agriculture; and (4) improve economics and public health of Menominee Nation through increased local production of fish and produce. The project's extension and education products will serve as models enhancing intertribal research and extension relationships and impacting the national health and economic stability of Native Americans and other URM. Overall, the project outcomes will contribute to the USDA goal of transforming the food and agricultural system to increase domestic agricultural production by 50% and reduce environmental footprint by 40% by 2050 while improving the lives of rural, low-income, and URM.

The *Scientific Report of the 2020 Dietary Guidelines Advisory Committee* (2020 Committee) reported that six in ten Americans have diet-related chronic conditions (CC), with four in ten having two or more CC.[1] In 2016, cardiovascular disease (CVD) and type 2 diabetes (T2D) cost America $555B and $327B, respectively, with costs expected to more than double by 2035.[2, 3] Lower-income and URM households are disproportionally affected by CC and food insecurity,[4, 5] highlighting the importance of targeted research and outreach. One strategy for decreasing the risk of CVD, T2D, and some cancers includes replacing saturated fats with polyunsaturated fatty acids (PUFA), often referred to as "heart-healthy fats".[6–12] **Strategies to increase the intake of heart-healthy foods—such as hemp grain and fish—are critical to slow the rise of chronic disease in the U.S.** Furthermore, targeted nutrition outreach is needed to ensure that the most vulnerable populations have equitable access to healthy, nutrient-dense foods.

As you know, the passage of the Agriculture Improvement Act of 2018 removed hemp [*Cannabis sativa* with <0.3% Δ9-tetrahydrocannabinol (THC)] from the list of controlled substances. Hemp is used for fiber, food, and medicine.[13, 14] Hemp grain is an excellent source of protein and PUFA [15] for human consumption. In 2019, 94% of U.S. growers produced metabolite hemp; only 10% and 11% grew for grain and

fiber, respectively (values exceed 100% due to producers with multiple crop types).[16] In 2020, there were ~16,000 acres of hemp grain production in the U.S.[17] **To become a stable component of the agricultural economy, the nascent U.S. hemp market needs diversification and a robust establishment of the grain sector.**

Hemp seed/grain has the potential to be an excellent domestic feed ingredient for many types of livestock. It is nutrient-dense, with roughly 25% protein, 35% oil, 25% carbohydrates, 10% moisture, and 5% minerals.[15, 18] Seeds are consumed whole or dehulled (hearts). Hearts have a healthy balance of omega-6 to omega-3 fatty acids (2.5:1)[15, 19] and easily digestible protein[19–23] with sufficient essential amino acid levels.[15] In Europe, hemp grain is used in animal feeds. A 2011 European Food Safety Authority study evaluated the use of hemp grain, seed cake, seed oil, and whole plant flour in animal feeds.[24] Most THC localizes to the seed coat (hull), with seeds containing less than 12 mg/kg[24] and hearts 0.5 mg/kg.[25] Cannabidiol (CBD) and other cannabinoids are likely restricted to the seed coat. Cleaning and removal of hulls provide a product with low levels of cannabinoids. The committee concluded that hemp seed products with ≤10mg THC/kg were safe based on risks. One potential concern of hemp in feed is consumer ingestion of cannabinoid residual in the animal tissues. Estimated daily tolerance intake for THC is 0.0004 mg/kg body weight (0.024 mg for a 60kg adult).[24] Other countries allow up to 0.0007 mg THC/kg body weight (up to 0.042 mg for a 60 kg adult) per day. In 2018, the Food and Drug Administration (FDA) approved hemp hearts (H.H.), hemp seed oil (HSO), and hemp protein (H.P.) with ≤10 mg THC/kg as Generally Recognized as Safe (GRAS).[26] Based on expected maximum consumption, with a content of 0.3 mg/kg, 0.6 mg/kg, and 6 mg/kg of THC in H.H., H.P., and HSO, respectively, the cumulative expected daily intake was 62.3 μg of THC for persons aged 2 and older. **Establishing hemp as a safe feed ingredient could provide new grain markets for the hemp sector and an economical and environmentally sustainable feed to produce heart-healthy foods.**

How much cannabinoid residue from hemp grain and derived products (H.H., HSO, and H.P.) transfers to feeds and animals remains unclear. Uncertainty leads to safety concerns and hinders the approval for use in feeds. The SUSHI project is conducting (i) feeding trials using hemp grain ingredients in trout and (ii) nutrient and cannabinoid analyses of hemp grain, hemp feed ingredients, fish feed, and the edible portions of fish fed hemp-containing feed to determine the safety and efficacy of using hemp feed ingredients in a trout aquaculture system. In addition, the SUSHI economics team is performing market research, production economic assessments, and valuation of socio-environmental net benefits for the sustainability of the suggested system. To increase diversity in the agricultural workforce, our extension/education team is (i) developing certificate programs in hemp production and aquaponics, (ii) scholarships to Native Americans to complete bachelor's degrees in Agri-STEM, and (iii) providing start-up funds for new aquaponics producers. The project also provides outreach and education about hemp, aquaponics, and nutrition to consumers to increase consumption of healthy, nutrient-dense foods, including hemp grain, fish, and produce.

The long-term objectives of the SUSHI project are to:

1. Provide a sustainable source of fish livestock with an enhanced nutritional value—contributing to the nation's health, especially URM.
2. Create niche markets for hemp and aquaculture, increase production opportunities for farmers, create jobs, and enhance the economy—increasing agriculture profitability in economically and environmentally sustainable ways.
3. Develop a pipeline of Black and Indigenous and lay workforce with the appropriate technical and professional skills to fulfill employment needs in STEM, nutrition, water resource management, and sustainable agriculture.

The SUSHI project is comprehensive, integrative, and transdisciplinary in addressing concerns in the hemp, aquaculture, nutrition, and agricultural workforce sectors. Strategic relationships have been established across industries to ensure that the outputs are relevant and adapt to changing needs. Continued efforts to impact the hemp grain and fiber sectors should consider similar approaches to what is described here to promote sustainable growth of the domestic hemp market.

The SUSHI project has established partnerships with all stakeholder groups impacted by our work. We meet regularly with an external stakeholder advisory board. Their feedback and guidance ensure that our work remains relevant to stakeholder needs. As a result of these connections, we are aware of some of the significant concerns within the hemp grain sector. The concerns listed here do not necessarily re-

flect the views of me, the SUSHI team, or Central State University. Expressed stakeholder concerns include but are not limited to:

- *Access to capital to build the supply chain.* For example, one entity that processes hemp grain into multiple food and other products was unable to apply for the USDA Food Supply Chain Guaranteed Loan Program because a percentage of the products were used in applications in addition to the food supply (*e.g.,* oils are food and can be used in cosmetics; sweeteners are food and used in industrial applications). Narrow definitions for these programs currently hinder access to capital for grain processors. This prevents the expansion of infrastructure needed to increase the production of grain products necessary to meet market demands. **Strategies to increase access to capital for grain and fiber processors are required.**
- *The burden of THC-testing for non-metabolite hemp crops.* Currently, the rules and regulations for THC-testing and compliance treat fiber and grain (industrial hemp) the same way as cannabinoid/floral/metabolite hemp. The hemp industry wants hemp grain and fiber crops to be regulated like other commodities (*e.g.,* soy, corn, and wheat), as hemp will likely be integrated into rotations with row crops. Hemp grain must be tested for mycotoxins, heavy metals, allergens, *etc.,* like all grains used for food. Still, farmers have the additional burden of testing the non-grain parts of hemp to ensure THC compliance when it has little relevance to the GRAS-approved grain product. **A review of current THC-testing rules for grain and fiber hemp crops is needed.**
- *Cost and unwieldiness of the feed approval process.* Currently, each ingredient produced from hemp grain must be individually approved for each animal species and class. For example, if hemp grain protein is approved for use in Growing/Starter Layers (chicken), another application must be submitted for Finisher Layers, Laying Layers, and Breeder Layers. Hemp seed oil or whole hemp hearts would need additional applications for each group.[27] Industry representatives have expressed that hemp grain for animal feed should have been approved at the same time that it was approved as GRAS for human consumption. Others have expressed that the regulations are more burdensome for hemp grain products than other feed ingredients because non-metabolite hemp is treated as a drug unlike other grains. Approving hemp grain as a feed ingredient would open new markets and expand current markets by providing an outlet for hemp grain grown for human consumption that does not meet food grade standards. **An infusion of money into the feed approval system (FDA–CVM, AAFCO) is needed to improve the process for hemp grain feed approval.**
- *Lack of consumer awareness regarding the nutrient benefits of hemp grain and products.* A long prohibition and association with marijuana have instilled a deep and lasting confusion about hemp within the mind of U.S. consumers. Engagement with the public demonstrates that a portion of the U.S. population still fails to understand the difference between hemp and marijuana. Some of those familiar with the crop lack information about the positive benefits of hemp grain and products. Such association restricts market opportunities.[28] **U.S. consumers need supplemental education about the nutritional benefits of hemp grain and products.**
- *Lack of incentives for hemp growers to partner with domestic processors/producers.* Hemp growers continue to struggle to find buyers for their crops. While there are a limited number of clearinghouses for hemp processors and growers, representatives from both groups have noted that more work is needed in this area. **Developing systems to connect prospective growers with processors would reduce this barrier.**
- *Lack of incentives to develop hemp cultivars adapted to production in the U.S.* Based on U.S. variety trials conducted across the U.S., only certain parts of the country can successfully utilize high-yielding cultivars developed internationally. For example, Canadian hemp varieties often perform well in northern states but typically under-perform in Midwest or South. The lack of varieties developed for various regions hinders specific sectors of the country from expanding the grain and fiber hemp industries. Crops adapted to produce higher overall yields, and higher quantities of certain nutrients (*e.g.,* specific fatty acids or amino acids) would further expand market options and lower overall production costs. A challenge for breeding regionally adapted crops is THC limits. THC levels of important lines may exceed legal limits during the breeding scheme, thereby restricting the development of those genetics. Being allowed to handle germplasm containing higher levels of THC (*e.g.,* 1%) would mitigate legal com-

pliance concerns while breeding to include new traits. The final variety released could still be required to meet a lower THC threshold (*e.g.,* 0.3%) for sale to hemp growers. **Allowing hemp breeders to work with germplasm having higher THC levels would enable the development of elite varieties adapted for specific regions.**

There is a need to stimulate the nascent domestic hemp production to make it a sustainable part of the U.S. agricultural economy. An increase in hemp grain production could positively impact various sectors, including hemp, livestock, manufacturing, and human nutrition and health.

Through personal experiences, research knowledge, and stakeholder engagement, the SUSHI project team recognizes the complex challenges facing the hemp industry and is confronting those challenges to provide solutions to move the industry forward through this project and others in which the team members hold positions. For this testimony, project team members, Drs. Mark, McFadden, and Schluttenhofer provided valuable insights into the U.S. hemp industry's challenges while identifying robust and lasting solutions. Limitations faced by the hemp industry can be reduced by (i) increasing access to capital for processors, (ii) reviewing current THC-testing rules, (iii) infusing money into the feed approval system, (iv) educating consumers about the nutritional benefits of hemp grain and products, (v) developing systems to connect current and potential growers with processors and (vi) allowing hemp breeders to work with higher THC-containing germplasm. Considering and implementing these proposed solutions would enhance the industry's short- and long-term success. I, and my SUSHI team, look forward to continuing to support this Committee with the information necessary to make the hemp industry a lasting pillar of the U.S. agricultural economy.

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The CHAIR. Thank you very much for that.
Mr. Grignon, please begin when you are ready.

STATEMENT OF MARCUS GRIGNON, EXECUTIVE DIRECTOR, HEMPSTEAD PROJECT HEART, GREEN BAY, WI

Mr. GRIGNON. *Posoh mawaw Niwak, nekatow manawich kikitem.* Hello, everyone. I am going to speak. My name is Marcus Grignon, and I am the Executive Director of Hempstead Project Heart, a nonprofit organization dedicated to redeveloping thriving hemp economies that connect Tribal, urban, and rural communities throughout the United States. Hempstead Project Heart is a member of the Rural Coalition, the Peace Development Fund, and the National Hemp Association's Standing Committee of Hemp Organizations. I have come before you today to testify on the USDA Hemp Production Program. I am also here for the American hemp pioneers who pushed our country towards acceptance: Alex White Plume, Chris Boucher, Jack Herer, Barbara Filippone, Lawrence Serbin, and Richard Rose.

Hemp has a conflicting past in our country. From the founding of our nation and lead up to the passage of the Controlled Substances Act, hemp was considered a cash crop and useful for our military during World War II. After passage of the Controlled Substances Act, hemp became defined as a *drug* and *non-useful,* both of which is untrue. The best way I have educated the American people over the last 6 years on the difference between hemp and marijuana is an analogy of the pepper family. With peppers, you have habanero, chipotle, ghost pepper, jalapeño. These peppers are what I would call your high grade marijuana, whereas green, yellow, and red bell peppers is what I would call your hemp. Both peppers are part of the same family but distinctly different.

The historical perspective of hemp played a large role in building our country during the early years of our democracy. Many states such as Pennsylvania, Kentucky, Virginia, and Wisconsin, to name a few, have rich histories of hemp playing a vital role in their economies. From 1902 to 1944, the USDA studied hemp extensively as a solution to our country's fiber shortage. Lyster Dewey led this research for USDA. Dewey, with the help of Dr. Andrew Wright and Senator Alexander Wiley, created the 20th century American hemp industry. Through their research, they uncovered ¾ of the land in the United States can grow hemp. Hemp grows well with crop rotations. Hemp's long taproot penetrates the soil and loosens the undersoil layers. Drying kilns for hemp fiber should not exceed 150° Fahrenheit. There is a wealth of knowledge on how to produce and process hemp from these records at the National Agricultural Library.

My path as an American hemp farmer is not linear. I began my journey as a hemp researcher in 2015 for my Tribal nation, the Menominee Indian Tribe of Wisconsin and the College of Menominee Nation, an institution of higher education. We grew hemp on our

homelands for research purposes to spur economic development for our people under section 7606 of the 2014 Farm Bill and under the guidance of the Department of Justice's Wilkensen memorandum. Unfortunately, we were unsuccessful due to Federal overreach by the Drug Enforcement Agency's raid on our hemp crop in October 2015. Under the auspices of a marijuana raid on Tribal lands, the DEA took our hemp crop at harvest time that had seed with a 1 year acclimation to the Great Lakes region. Even our topsoil was seized by a bulldozer. We never received the test results from DEA to prove our hemp had tested over the legal limit.

After the 2015 growing season, I dedicated myself to be an education advocate and push for hemp to be re-legalized in Wisconsin and in the United States through Hempstead Project Heart. As part of a coalition of Americans, we push hemp to be legal again and were successful in Wisconsin in 2017. In 2018, our coalition focused on the farm bill to revise section 7606, making hemp fully legal in the United States and to uphold Tribal sovereignty for the 574 Tribes within our country to grow hemp without Federal interference. We were successful, and for the Committee Members I testify before today I say *Waewaenen*. Thank you for your support.

As the 2023 Farm Bill is upon us, I want to advocate to strengthen the hemp production provisions from the 2018 Farm Bill. There needs to be a separation between the definition and regulation of industrial hemp from cannabinoid and floral hemp. These crops are easily differentiated with a visual inspection. The industry advocates for a grain and fiber exemption from testing and background checks for producers. There is also legislation that we will introduce soon called the Industrial Hemp Exemption Act of 2022.

Bank regulations need revision to ease current restrictions for hemp operations. It is difficult to find a bank that will take business accounts connected to hemp production and processing, not to mention insurance companies. There needs to be a USDA stamp of approval for hemp being shipped between the various jurisdictions in the United States. This will help with any issues that arise with interstate commerce. While these suggestions do not cover all the needed changes, these top three will enhance the American hemp industry, ease burdensome regulations for farmers, and create more demand for hemp-made materials.

And I believe my time is up.

[The prepared statement of Mr. Grignon follows:]

PREPARED STATEMENT OF MARCUS GRIGNON, EXECUTIVE DIRECTOR, HEMPSTEAD PROJECT HEART, GREEN BAY, WI

Posoh mawaw Niwak, nekatow manawich kikitem (Hello everyone, I am going to speak). My name is Marcus Grignon, and I am the Executive Director of Hempstead Project Heart, a nonprofit organization dedicated to redeveloping thriving hemp economies that connect Tribal, urban, and rural communities throughout the United States. Hempstead Project Heart is a member of the Rural Coalition, the Peace Development Fund, and the National Hemp Association's Standing Committee of Hemp Organizations. I've come before you today to testify on the USDA Hemp Production Program. I am also here for the American pioneers who pushed our country towards acceptance of hemp: Alex White Plume, Chris Boucher, Jack Herer, Barbara Filippone, and Richard Rose.

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The summer of 2019, hemp came back to the Menominee Reservation. Our research focused on integrated pest management in hemp production. We were able to identify various pests and pollinators during the growing season. It is truly amazing to observe the growing cycle of hemp and watch the tree frogs, bees, aphids, lady bugs, and Japanese beetles show up at different times. This research in 2019 laid the groundwork for our current research on the effects of Japanese beetles on hemp production through the USDA Sustainable Agriculture, Research, and Education program.

In 2020, the Native American Agriculture Fund, a foundation created by the *Keepseagle* settlement, awarded the College of Menominee Nation and Hempstead Project Heart a grant to develop a hemp fiber feasibility study and begin to acclimate a hemp fiber variety in the Great Lakes region. We are in our third and final year of research for this grant. The Chairman of the Menominee Indian Tribe of Wisconsin, Ron Corn Sr., supports Hempstead Project Heart's efforts to spur hemp research, production, and product development on the Menominee Reservation.

As the 2023 Farm Bill is upon us, I want to advocate to strengthen the hemp production provisions from the 2018 Farm Bill. (1) There needs to be separation between the definition and regulation of industrial hemp from cannabinoid or floral hemp. These crops are easily differentiated with a visual inspection. The industry advocates for a grain and fiber exemption from testing and background checks for the producer; (2) bank regulations need revision to ease current restrictions for hemp operations. It is difficult to find a bank that will take business accounts connected to hemp production and processing; (3) There needs to be a USDA stamp of approval for hemp being shipped between the various jurisdictions in the United States. This will help with any issues that arise with interstate commerce. While these suggestions do not cover all the needed changes, these top three will enhance the American hemp industry, ease burdensome regulations for farmers, and create more demand for hemp made materials.

The reemergence of the hemp industry is a renewal of our American traditions. Our country prospered on the production of hemp, and we can do it again. Today, many Americans from all walks of life are at the forefront of rebuilding the American hemp industry. Barbara Filippone and Summer Star Haeske of Envirotextiles, a successful USDA Bio-Preferred company that works on various hemp fiber products and supplies the fashion industry with high quality hemp textiles. Aaron Rydell and Greg Wilson of HempWood, a hemp building materials company that specializes in the first HempWood flooring. Mike McGuire of Western Fiber, who built a hemp processing plant by retrofitting a cotton gin. Ken Anderson and Colin Felton of Bast Fiber Products created composite decking made from hemp fiber. All these innovative American entrepreneurs need the support of Congress to grow the hemp industry in our country. We look forward to stronger hemp provisions in the 2023 Farm Bill.

As I wrap up my testimony today, I want to leave you all with a historical perspective by Lyster Dewey. In 1939, Dewey wrote in a report to the Chief of the Bureau of Plant Industry, "The future of the hemp industry in this country seems to depend largely on the development of strains/varieties of hemp free from marijuana." Dewey knew in 1939 America would need to develop their own hemp varieties to grow the industry and not depend on international seed supplies. The 2023 Farm Bill is our opportunity to ease restrictions, spur economic development in our communities, and innovate the products we need to fill the gaps in our supply chains. I ask Congress to strengthen the hemp provisions in the 2023 Farm Bill to open the door for creativity and innovation to propel the American hemp industry into the 21st century.

Waewaenen (Thank you) for your time and yield the floor.

APPENDIX A

Proposal for Industrial Hemp Grain and Fiber Exemption

Cannabinoid Hemp Framework Maintained

www.HempExemption.com

Why are the current regulations problematic for grain and fiber industrial hemp?

- Unreasonable financial burden and risk to farmers
- Unnecessary burden on Departments of Agriculture
- Additional costs hinder industrial hemp's ability to compete with other commodity crops
- Confusion with industries including banking, transportation, insurance, and advertising, discourages investment in critical infrastructure
- End-use products hold long-standing exemption under Controlled Substances Act

What is the solution?

A separation between the definition and regulation of industrial hemp from cannabinoid or floral hemp. These crops are easily differentiated with a visual inspection.

Grain and Fiber Industrial Hemp—Exemption Framework

Field crop grown using standard agricultural practices and the harvested material is only ***grain and/or fiber.***

Maintain the current regulatory framework for cannabinoid hemp production with the following new framework for industrial hemp:

- 2018 Farm Bill licensing with added designation for only grain/fiber production & harvest (including GPS coordinates of land on which hemp is produced)

- Signed declaration that producer will only harvest grain/fiber and will not harvest or sell floral material or extract any resin from crop (Note: full use of hemp seed/grain authorized)
- No background check required
- Required visual inspection (*i.e.,* in-person, virtual, aerial with drones, or unmanned aircraft)
- No sampling or testing for uniform production consistent with designation
- If visual inspection reveals inconsistent crop production with designation, documented verification required (*i.e.,* seed/variety receipts, sales contract, planting report), and the Department of Agriculture reserves the right to require harvest inspection
- Intentional violations: crop destruction, fine/civil penalty, restricted from program participation for 5 years

Why a grain and fiber exemption and not a universal certified seed exemption?

- Certified seed alone creates an inevitable loophole for illegal cannabis cultivation with no verification of cannabinoid crops
- Existing certified varietals are not performance-tested for every climate zone of the U.S.
- Impedes a free-market approach and encourages monopolies

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APPENDIX B

WISCONSIN LEGISLATURE
ASSEMBLY CHAMBER
MADISON

March 3, 1943

Hon. Alexander Wiley
United States Senate
Washington, D.C.

Dear Sir:

As you no doubt know, our good state in the past has produced four-fifths of all the hemp grown in the United States.

It now comes to my attention that the federal government wants more hemp grown and is going to spend several hundred thousand dollars in other states to build new plants to produce this hemp. If the federal government needs more fiber for the war effort, the plants in our good state would be able to turn it out with only some consideration and do it in a lot faster time than it would take to build new plants.

One of the plants that I have contacted tells me that as yet they have not been able to get any assurance that they will have any hemp seed for 1943. This firm tells me that last year they had to operate with old harvesters and now the International Harvester Company tells them that they will not be able to get any parts this year for the old machines or any new machines. This company last year produced 2300 acres of hemp and could have produced more if they could have secured the seed and equipment.

I hope you will give this your attention both for the benefit of our good state and to speed the production of hemp for the war effort.

Very truly yours,

Jesse A. Cahill

JAC:eb

APPENDIX C

BUREAU OF PLANT INDUSTRY
WASHINGTON

DIVISION OF
FIBER PLANTS

May 21, 1935.

Mr. Sidney D. Wells,
Combined Locks Paper Company,
Box No. 1,
Combined Locks,
Wisconsin.

Dear Sir:

In response to a request in your letter of May 18th, a copy of Bulletin No. 404 on "Hemp Hurds as Paper-Making Material", is enclosed herewith.

The edition that was printed on paper made of 80% hemp hurds and 20% wood pulp is exhausted, and there are not many of the bulletins printed on the ordinary paper like the enclosed still available.

So far as I have been able to learn hemp hurds were used commercially for paper making only about 1 or 2 years at paper mills in Central Ohio where the principal raw material for paper pulp consisted of waste from furniture factories. That use was discontinued as early as 1920 and I do not know that any paper mill has taken up the work since then although hemp hurds have been sent for trial to several paper mills from the hemp scutching mills at Juneau, Beaver Dam, Waupun, and Brandon, Wisconsin.

If hemp hurds are used by your company I will be very glad to learn of it.

Very truly yours,

Lyster H. Dewey

Lyster H. Dewey.

APPENDIX D

[3 o-of-a19]
[Copy revised in Fiber Plants and submitted for publication as mimeograph circular Tuesday Nov. 28, 1923.]

HEMP FIBER PRODUCTION

By Lyster H. Dewey, Senior Botanist in Charge of Fiber Plant Investigations, and Andrew H. Wright, Agent, Fiber Plant Investigations, Bureau of Plant Industry, United States Department of Agriculture.

Hemp is grown in but a few localities in the United States. Since 1926 the crop has been produced only in Wisconsin, Kentucky and Illinois.

During the past 100 years, hemp has been cultivated successfully in several states, including New York, Kentucky, Missouri, Ohio, Michigan, Illinois, Indiana, Iowa, Minnesota, Wisconsin and California.

From about 1850 to 1915, practically all hemp grown in the United States was produced in "central" Kentucky. Since 1915 hemp growing was largely shifted to Wisconsin. Kentucky practically discontinued the crop. Since 1930 very little hemp has been grown anywhere in the United States.

Hemp is a fiber crop. The fiber is obtained from the stems (stalks) of the hemp plant, Cannabis sativa. To get the fiber out, the stalks must be partially rotted (retted) and then put through machines which separate the fiber from other tissues of the stalks.

A dense stand of tall, slender stalks is needed to produce a good yield of fiber. Thus to grow a satisfactory crop of hemp requires very rich soil and a good supply of moisture throughout the growing season.

Conditions of soil and climate in many sections of the United States are well suited for growing hemp. This has been thoroughly established by many years of experience. The hemp problem in recent years is not in growing the crop and preparing the fiber, but in obtaining a satisfactory market.

While at one time or another hemp fiber has been used for many purposes in the United States, yet since about 1920 its use has been limited to a few so-called specialties, such as cores for wire rope, marine lines and yarns, upholsterer's twines and high grade wrapping twines. A little has been used for oakum (packing) and some for mixing with weaker fibers.

During the past half century, except for a few years during the "world war period", American hemp has been unable to withstand the competition of other fibers. The principal replacing fiber has been jute, though directly or indirectly the market for hemp has been greatly affected by cotton, and the hard fibers sisal, henequén, and abacá (Manila hemp).

The decrease in the use of hemp in the United States applies not only to American hemp, but to all hemp, regardless of the source of production. While much hemp is produced in such foreign countries as the Soviet Republic, Italy, Yugoslavia, Roumania, and Poland, yet none of consequence is brought into the United States from these countries. Thus the difficulty in obtaining a market for American grown hemp is not because of competition with foreign hemp production, but because of competition with fibers other than hemp.

Hemp Production for Last 58 Years

The following table of production of hemp in the United States and importations gives approximate figures only, and round numbers.

Table 1. Hemp Production in United States and Imports of Hemp Fiber 1876 to 1933 by yearly average for 5 year periods.

Period	Acres Grown in United States	Tons of Fiber Produced in U.S.	Hemp Fiber imported, Tons.
1876 - 1880	15,000	7,000	
1881 - 1885	11,000	5,000	
1886 - 1890	16,000	7,500	
1891 - 1895	11,000	5,000	*4,500
1896 - 1900	10,000	4,500	5,000
1901 - 1905	12,000	5,500	5,000
1906 - 1910	10,000	4,500	6,000
1911 - 1913	10,000	4,500	6,000
1914 - 1918	19,500	8,500	5,000
1919 - 1923	8,600	3,800	4,000
1924 - 1928	4,300	1,800	2,000
1929 - 1933	1,200	500	1,000

*Hemp importations not recorded separately previous to 1890.

Hemp Prices For Last 20 Years

The record of prices obtained for American hemp since 1914 is fairly complete, yet the actual average price obtained for all grades during any year can be approximated only. Table 2, which follows, is based on priced obtained for American hemp line of average quality. Other grades of hemp, such as poor line and tow are not included.

Table 2. Approximate Average Yearly Prices Obtained for American Line Hemp from 1914 to 1933 inclusive.

Year	Line Hemp Cents a Pound	Year	Line Hemp Cents a Pound
1914	12.50	1924	14.00
1915	13.50	1925	18.00
1916	14.00	1926	13.00
1917	15.00	1927	12.00
1918	18.00	1928	11.00
1919	22.00	1929	15.00
1920	19.00	1930	11.00
1921	12.00	1931	10.50
1922	11.00	1932	10.00
1923	11.00	1933	9.00

Hemp Yields Well on Fertile Soils

In sections which have fertile soils and sufficient rainfall throughout the growing season, hemp yields well. On suitable soils in Kentucky, Illinois and Wisconsin, hemp has rarely failed to produce a good crop. Yields have usually ranged from 750 to 900 pounds of fiber per acre. The yield of dry hemp stalks, as cured in the shock, is about 5 tons per acre, or of dry stalks after dew-retting, about 3 tons per acre.

Farmers, who have had experience with hemp, like the crop because it assists in controlling weeds, leaves the soil in excellent condition for succeeding crops and is not noticeably "hard on the land".

There are also things about hemp which farmers dislike. The entire crop is removed from the farm, thus no straw, roughage, bedding or manure

is obtained as a by-product. Also the cash outlay is rather large. The acre cost for seed is rather high and the rental for harvesting machinery is considerable.

Special Harvesting and Milling Machinery Necessary

It is useless to grow hemp unless full equipment for harvesting and milling are provided. Such equipment is expensive and requires experience to operate. Unless there is a hemp mill within hauling distance the crop cannot be marketed.

One mill can handle around 700 acres of hemp, and one harvesting machine can take care of about 100 acres.

Fertile Soil Necessary

There is no use in attempting to grow hemp except on rich soil. Good silt loams are necessary. In the fertile soil areas where the crop is grown, it is the custom to select the best land on the farm for hemp. The soil must be rich in organic matter, well supplied with manure, and thoroughly drained.

Hemp on Marsh Soils

The general experience with hemp on marsh soils in the United States has not been satisfactory. Some marshes produce a very rank growth; others produce a very short growth. Where a rank growth is obtained, the yield of stalks is high, but the quality of the fiber is so poor that it is practically worthless for spinning. Where a short growth is obtained, there is some evidence that the difficulty can be corrected by the use of commercial fertilizers. Potash is generally necessary, though both phosphorus and potassium may be required. Usually it is best to avoid marsh soil in growing hemp.

Hemp Assists in Killing Weeds

Hemp is the best crop we have for smothering weeds, yet weed infested soil must be properly prepared in order to give the hemp a chance.

The impression is entirely too common that quack grass and Canada Thistle lands can be cleaned by seeding them to hemp after ordinary preparation. This cannot be done. Such lands must be first thoroughly worked to subdue the weeds. Any method that will do this is satisfactory. If the land is not fertile, it should be given a heavy application of manure in the fall. Early in the spring, the soil should be worked up thoroughly and kept worked to the very time the hemp is seeded. If the weeds are well subdued and kept under control until the hemp is planted, good results will be obtained, otherwise the weeds are very liable to choke out the hemp.

No Danger From Hemp as a Weed

Hemp is an annual plant and will not become troublesome as a weed. It is easy to eradicate. The seeds are not long lived, and there are no underground roots or stems which live over from one year to another. Hemp has not been found troublesome as a weed in any section of this country. Notions to the contrary are entirely unfounded.

Hemp Does not Exhaust the Soil

Hemp removes about the same amount of fertility from the soil as does a good crop of corn. Because it grows rank and luxuriant, it is often incorrectly contended that it is "hard on the land". Hemp requires a fertile soil for its profitable growth, but this does not mean that it exhausts fertility, for when retted on the land where it grows, as is the

custom in the United States, much of the soluble plant food elements are returned to the soil. Farmers, who have grown hemp for many years, unanimously agree that it is a very satisfactory crop so far as the soil is concerned; that it greatly assists in getting rid of weeds and leaves the soil in an excellent condition for succeeding crops.

Hemp Crop Should be Rotated

Hemp should not be grown continuously on the same soil for the same reason that corn or grain should not be so grown. It does best after corn, alfalfa or clover. It does not follow small grain or timothy satisfactorily, but may do well on good bluegrass sod fall-plowed. The usual practice is to plant the hemp after corn, follow with a small grain seeded down to clover, then follow the clover with corn. The manure may be put on the clover sod in the fall preceding the corn.

On very fertile soils that are badly infested with weeds, hemp is occasionally grown two years in succession. When the object is to thoroughly rid the land of weeds and to lower the available nitrogen so that grain will not lodge, the practice of growing the crop two years is a good one. This cannot be done, however, except on soils that are unquestionably rich.

Commercial Fertilizers Useful

Information available indicates that commercial fertilizers may be used to advantage on soils that are not well supplied with manure. Ordinarily, the best fertilizer for hemp is barnyard manure, but it is evident that commercial fertilizer can be used to advantage to supplement manure. So far as is known, a complete fertilizer, one contain-

ing nitrogen, phosphorus, and potassium, is most likely to give the best results. A truck crop fertilizer such as that used for potatoes or sugar beets is probably the best in most cases, such as a 5-8-7, or a 4-8-6. The usual amount is around 300 pounds an acre. The use of 300 to 400 pounds an acre of superphosphate alone has also given good results on typical black prairie soils. Experience indicates that it is unwise to depend upon commercial fertilizer to offset lack of manure or natural fertility. On soils which will not grow hemp without using commercial fertilizer, it is probably best not to attempt the crop. On acid soils, lime at 3 to 4 tons an acre may be applied to advantage.

Thorough Preparation of Soil Necessary

A good seed bed is particularly necessary for hemp. Both fall and spring plowing has been found satisfactory, but as a usual thing, fall plowing seems to be best. The soil should be worked up thoroughly before planting, but should be firm. A corrugated roller used just before and just after seeding, will do much to put the seed bed in proper condition.

Early Seeding Usually Best

Results from seeding at different times vary in different seasons, but in the majority of years, early seeding is more satisfactory. Hemp may be planted a little earlier than corn. Some plant it practically as early as oats. The usual practice is to seed it just after the oats are planted and before corn planting starts.

Either Broadcast or Drill

Good stands have been obtained by using either a broadcast seeder or

a grain drill. The tendency, however, is toward using the drill instead of the broadcaster. If a corrugated roller is used after broadcasting, practically as good stands are obtained as with a drill. On soils which have a high proportion of clay and which are inclined to crust, broadcasting frequently gives better results. On all friable loam soils, drilling is probably the best method. A four-inch drill is decidedly preferable to a six-inch; an eight-inch drill should not be used. Hemp seeds should be covered not more than one inch deep.

Rate of Seeding

On average hemp soils, from four to five pecks of good seed to the acre seems to give the best results. On excessively fertile soils, five pecks are advisable. On soils less fertile than the average, four pecks are sufficient. Experience indicates that less than four pecks is rarely advisable on any soil. Hemp seed weighs 44 pounds to the bushel, or 11 pounds to the peck. On average soils, therefore, 44 to 55 pounds to the acre is needed. On less fertile soils, 44 pounds, and on very fertile soils 55 pounds are suggested.

Harvest When in Full Blossom

Hemp should be harvested when the pollen bearing plants are in full bloom. At this stage, the lower leaves have mostly fallen and the leaves below the top are usually yellowing. Generally, hemp harvested early, has the best season for retting, consequently it is better to harvest a little on the early side than to wait until it is too mature. So far as the quality and yield of fiber are concerned, it appears that

the crop may be harvested any time between blossoming and the first formation of seed. This means that there is a period of fully three weeks during which the crop may be harvested. Over-ripe hemp does not ret well and it produces a harsh fiber.

Harvest With Reaper or Spreader

Hemp must be harvested with machines designed for the purpose. In very small fields, the self-rake reaper is used to advantage. Fields of fibe acres or more are harvested with a special hemp harvester. This machine has been used for many years and is now standard equipment in hemp producing sections. It harvests the hemp and spreads it in one operation, thus doing away with hand labor. The hemp harvester operated by a tractor will harvest from five to ten acres a day.

Proper Retting Very Important

The retting of the hemp straw is the most important item in handling the crop, for the kind of retting obtained determines the quality and value of the fiber. The green stalks, after they are spread on the stubble, are allowed to remain there until they have been sufficiently decomposed so that the bark can be readily separated from the stems. The time varies according to weather conditions. If warm, moist weather occurs just after the crop is spread, retting will be very rapid and may be complete in two or three weeks. If it is dry and cool, retting may be delayed until very late in the fall. Usually the early fall is moist and warm, consequently early harvesting has a distinct advantage. In unfavorable retting seasons, there is a tendency to lift the hemp before it is retted. This should not be done. The hemp should be left spread out in the field until the bark can

be readily removed. It is better to leave the crop in the field even though it becomes covered with snow than to take it up when it is under-retted.

Retted Straw Bound, Shocked, and Stacked

When the hemp straw is properly retted, it is lifted and bound in bundles. This is done either by hand or with a special hemp binder. When labor is plentiful, binding by hand is a common practice; otherwise the machine binder is used. This machine has been carefully developed and is used wherever hemp is grown to any considerable extent.

The bound bundles are placed in shocks a little larger than those used for corn. When the bundles are well cured they may be either stacked on the farm or hauled to the hemp mill and stacked there. Some retting takes place in the stack and usually the fiber is more easily separated and cleaned after the straw has been in the stack a month or more.

Great care should be exercised in building stacks. They should be so constructed that each layer of bundles has a very pronounced pitch. The center should always be kept high. In lapping, but little of the butts of each layer should be exposed to the weather, as exposed parts will decompose if left long in the stack. There is too much careless stacking both on the farms and at the mills. Too much is invested in the retted straw to stack it carelessly. A little time devoted to careful stacking will remove a source of considerable loss to both hemp grower and miller.

When the retted hemp is delivered at the mill, the farmer's part of the work is completed.

Fiber Separated and Prepared in Mills

At the hemp mill the retted straw is put through a long dry kiln. This removes practically all of the moisture. The dried straw is then thoroughly crushed by a machine known as a "hemp brake". After the straw is crushed, the broken material is brushed and cleaned. This process is known as "scutching", and the machine on which the work is done is known as a "hemp scutcher". The long fiber as it comes from the scutcher, is twisted into hands, graded, and baled. This long, straight fiber is known as "line".

In scutching the hemp, a part of the fiber is brushed out with the woody portion of the plant. This part of the fiber is short, tangled, and snarled, and is known as "tow". Tow is also produced by short or tangled stalks. The tow is cleaned and prepared for baling in a special tow machine. The tow is not twisted into hands, but is baled in the form in which it comes from the machine.

Hemp Not a Perishable Crop

Hemp has a distinct advantage over many crop products in that it is not readily damaged and may be held for a long time either in the straw, or in the fiber. Hemp straw properly stacked, may be held for many months with very little loss. Baled hemp may be kept for several years without damage, provided it is properly stored.

Uses of Hemp Fiber

The principal purposes for which American hemp has been used are: (1) Commercial twines; (2) thread for sewing leather goods; (3) tarred marine ropes and lines; (4) oakum for packing. Contrary to common opinion, hemp is

not used for making binder twine, neither is it used for coarse ropes.

"Commercial twines" is a rather indefinite term used to include a wide range of twines used for various purposes, such as upholsterers' twine, ham string, belt cord, sail threads, and to some extent, high quality wrapping twines.

Threads made from hemp were used principally for sewing brooms and brushes; in the manufacture of such leather goods as shoes, harness, bags, pocket books, and leather clothing. These threads were often made from a mixture of hemp and flax fiber, although hemp alone has been used.

Marine cordage is manufactured to a very limited extent from hemp. However, considerable quantities of such marine products as houseline, for tying up awnings and general purposes, marline for binding the ends of ropes, and ratline for the steps in the shrouds, are made from hemp.

Some oakum is still made from the cheaper grades of hemp tow. There are two principal kinds, marine oakum and plumbers oakum. Marine oakum is used for calking ships, scows and small boats. Plumbers oakum is used for packing all kinds of pipes, such as spigot, steam, water supply, waste, sewer, and gas.

The CHAIR. Yes, it is. Thank you very much.

Mr. Wang, please begin when you are ready.

STATEMENT OF ERIC T. WANG, CHIEF EXECUTIVE OFFICER AND MANAGING DIRECTOR, ECOFIBRE, LTD.; VICE PRESIDENT FOR SUSTAINABILITY, U.S. HEMP ROUNDTABLE, LEXINGTON, KY

Mr. WANG. Thank you. Madam Chair, Members of the Committee, I am very grateful for the opportunity to testify to you today about the emerging U.S. hemp industry, its challenges and its many opportunities that can be achieved through your assistance in the 2023 Farm Bill. Today, I am testifying as the CEO of Ecofibre and also on behalf of the U.S. Hemp Roundtable, the industry's leading national advocacy organization for which I serve as the Vice President of Sustainability.

Ecofibre is a diversified industrial hemp company with operations in Georgetown, Kentucky; Greensboro, North Carolina; and Sydney, Australia. We have vertically integrated business oper-

ations across three divisions, and these three divisions include hemp grain for food, the use of the hemp flower for CBD, and the use of the hemp stalk for high performance industrial uses. We have been in operation in Australia since 1999 and in the U.S. since 2015, following the start of the Hemp Pilot Program, which was in the 2014 Farm Bill.

Over the past 20 years, Ecofibre has developed one of the largest and most diverse hemp genetics collections, and in the United States for the 2022 and the upcoming 2023 growing season, we will be providing hemp genetics to growers and universities to support 24,000 acres of industrial hemp for commercial and research purposes. This growing will take place across 19 states in the U.S.

While Ecofibre is a publicly traded company on the Australian Stock Exchange, most of our operations and, more importantly, over 90 percent of our capital has been invested in our operations in Kentucky and North Carolina. I have disproportionately invested into the U.S. due to the tremendous potential of the industrial hemp market, but more importantly, the strong bipartisan support that I have seen for developing a new highly sustainable agricultural crop for U.S. farmers.

Second, I have seen significant support for introducing new U.S. manufacturing industries to take advantage of the multitude of uses for industrial hemp.

And finally, there is an opportunity for a net-zero carbon solution via industrial hemp, which is considered to be one of the most carbon-negative agricultural or forestry crops available. Given that most things we produce and do in the world today are actually carbon-positive, industrial hemp allows us in a good way to actually think negative.

While there is tremendous opportunity, there are some challenges that the industry does face as it develops and matures. In passing the 2018 Farm Bill, Congress made it very clear of its intent to support production and sale of hemp and hemp derivatives such as CBD. As a result of the 2018 Farm Bill, thousands of U.S. growers planted hemp in response, with farming for CBD actually representing most of all hemp acreage at that time.

However, public statements by FDA officials stating that it is unlawful to sell ingestible hemp-derived CBD products have taken their toll on the industry. CBD commerce and investment has been chilled due to continued inaction at the Federal level, which has impaired economic opportunity for American farmers and processors. However, farmers are not the only ones who have been negatively impacted by this regulatory uncertainty. Consumers have also been impacted. Bad actors sell products without appropriate safeguards and mislead consumers with false label claims. Furthermore, some struggling farmers and businesses more recently have pivoted to market-intoxicating products such as Delta-8 THC, which has rightfully prompted the FDA and CDC warnings that they pose significant consumer health and safety risks, particularly for minors.

A clear regulatory pathway for CBD would not only relieve the economic pressure that is leading to this product shift, but it will also help ensure that products do not contain intoxicating hemp ingredients. At a recent May hearing, FDA Commissioner Califf testi-

fied to his disappointment in the lack of agency action on CBD and expressed his interest in developing a regulatory path. But he stated the FDA's authorities are limited under the current law.

As you develop 2023 Farm Bill, I ask you to provide the FDA with that authority by including language such as that found in H.R. 841, a bill that has 41 bipartisan cosponsors that would regulate CBD and other intoxicating hemp derivatives such as dietary supplements. I hope you will also consider including provisions from Representative Chellie Pingree's Hemp Advancement Act of 2022 (H.R. 6645), which, among other important things, would take necessary steps to limit the hemp product pathway to only non-intoxicating compounds.

So in closing, I would like to thank this Committee for its time today, and I believe that regulatory clarity for CBD will help create the positive momentum required to see the U.S. once again become the international leader in industrial hemp. Thank you.

[The prepared statement of Mr. Wang follows:]

PREPARED STATEMENT OF ERIC T. WANG, CHIEF EXECUTIVE OFFICER AND MANAGING DIRECTOR, ECOFIBRE, LTD.; VICE PRESIDENT FOR SUSTAINABILITY, U.S. HEMP ROUNDTABLE, LEXINGTON, KY

[Madam Chair], Members of the Committee, I am very grateful for the opportunity to testify to you today about the emerging U.S. hemp industry, its challenges, and its many opportunities that can be achieved through your assistance with the 2023 U.S. Farm Bill. I am testifying as the CEO of Ecofibre and on behalf of the U.S. Hemp Roundtable, the hemp industry's national advocacy organization, for which I serve as Vice President for Sustainability.

Ecofibre is a diversified industrial hemp company with operations in Georgetown, KY, Greensboro, NC and Sydney, Australia. We have vertically integrated operations across three business divisions that include hemp grain for food, hemp flower for CBD and the hemp stalk for high-performance industrial uses. We have been in operation in Australia since 1999 and in the U.S. since 2015 following the start of the hemp pilot program in the 2014 Farm Bill.

Over the past 20 years Ecofibre has developed one of the largest and most diverse hemp genetics collections. In the United States for the 2022–23 growing season, we are providing hemp genetics to growers and Universities to support 24,000 acres of industrial hemp for commercial and research purposes. This growing is taking place in 19 states.

While Ecofibre is publicly traded on the Australian Stock Exchange, most of our operations and more importantly over 90% of our capital has been invested in our U.S. operations in KY and NC.

I have disproportionally invested into the U.S. due to the tremendous potential of the industrial hemp market but more importantly the strong bipartisan support that I have seen for developing a new highly-sustainable agricultural crop of U.S. farmers, introducing new U.S. manufacturing industries to take advantage of the multitude of uses for industrial hemp, and finally a net-zero carbon solution via industrial hemp which is considered to be one of the most carbon-negative agricultural or forestry crops available. Given most things that we produce and do in the world today are carbon positive, industrial hemp allows us, in a good way, to Think Negative.

While there is tremendous opportunity, there are some challenges that the industry does face as it develops and matures. In passing the 2018 Farm Bill, Congress made clear its intent to support the production and sale of hemp and hemp derivatives such as CBD. Thousands of U.S. growers planted hemp in response, with farming for CBD representing most of all hemp acreage. However, public statements by FDA officials stating that it is unlawful to sell ingestible hemp-derived CBD products have taken their toll on the industry. CBD commerce and investment have been chilled due to continued inaction at the Federal level, impairing economic opportunity for American farmers.

Farmers are not the only ones who are being negatively impacted by this regulatory uncertainty. Consumers are also impacted. Bad actors are selling products without appropriate safeguards and misleading consumers with false label claims.

Further, some struggling farmers and businesses have pivoted to market intoxicating products such as Delta-8 THC, prompting FDA and CDC warnings that they pose significant consumer health and safety risks, particularly for minors. A clear regulatory pathway for CBD would not only relieve the economic pressure that is leading to this product shift, but it would also help ensure products do not contain intoxicating hemp ingredients.

At a May hearing, FDA Commissioner Robert Califf testified to his disappointment in the lack of agency action on CBD, and expressed his interest in developing a regulatory path, but stated that FDA's authorities are limited under the current law. As you develop the 2023 Farm Bill, I ask you to provide FDA with that authority by including language such as found in H.R. 841, a bill with 41 bipartisan cosponsors that would regulate CBD and other non-intoxicating hemp derivatives as dietary supplements.

I hope you will also consider including provisions from Rep. Chellie Pingree's Hemp Advancement Act, which among other important things, would take necessary steps to limit the hemp product pathway to only non-intoxicating compounds.

I would like to thank this Committee for its time today and I believe that regulatory clarity for CBD will help create the positive momentum required to see the U.S. once again become the international leader in industrial hemp.

ERIC WANG,
CEO, Ecofibre,
VP for Sustainability, U.S. Hemp Roundtable.

The CHAIR. Thank you.

I would now invite Mr. Quarles to begin when you are ready.

STATEMENT OF HON. RYAN F. QUARLES, PH.D., COMMISSIONER, KENTUCKY DEPARTMENT OF AGRICULTURE, FRANKFORT, KY

Dr. QUARLES. Thank you, Chair Plaskett and Ranking Member Baird, for the opportunity to address you today. My name is Ryan Quarles, and I serve as the Kentucky Commissioner of Agriculture first elected in 2015 and reelected to this office in 2019. It is an honor to serve our employees, our 76,000 farm families, and the 200,000 Kentuckians that engage in agriculture every day.

From 2020 to 2021, I also served as President of the National Association of State Departments of Agriculture, which gave me the opportunity to learn not just about hemp but other agricultural issues that help benefit Kentucky and American agriculture.

As you may know, Kentucky is one of the first states that focused on bringing hemp back. Our history of hemp dates back to a very famous Kentucky hemp farmer, Henry Clay, who went on to serve as Speaker of the United States House of Representatives. Hemp was first grown in Kentucky in 1775, and to this day, many farm families have a deep personal connection to hemp. My great grandfather grew hemp on the banks of the Kentucky River, while my grandfather fought in World War II as a Marine.

When taking office in 2016, we took full advantage of the 2014 Farm Bill's authorization for state departments of agriculture to research this crop underneath section 7606. And I am proud to say that we accomplished that goal. Kentucky's legislative and regulatory framework is widely recognized today as one of the best in the nation. We are grateful that Kentucky's hemp licensing program and data collected through the University of Kentucky and other colleges and universities were frequently cited in the final rule that USDA promulgated in January of 2021.

Today, Kentucky entered its ninth year of growing hemp, again legally. And here are a few products that we make. Number one, as cited earlier, Victory Hemp Foods, hemp hearts, which are sold

legally in grocery stores across America. We have another company named HempWood that is selling hardwood floors made out of hemp, as well as Ecofibre, who you just heard from with Eric Wang. We also have floral products primarily centered around CBD products that are being sold across the United States in pharmacies and Tractor Supply Company. This is in addition to dozens of small family-owned hemp companies marketing CBD across the country.

Today, we are focused on challenging our hemp companies to set up roots in Kentucky. Like many other states, we saw a rapid expansion in the number of acreage grown through 2015 through 2019, which was followed by an equally rapid decline beginning with the 2020 growth season. One reason for this decline was that production increased after the 2018 Farm Bill legalized hemp, and the amount of hemp grown far outpaced demand. So here in 2022 we are still growing hemp in Kentucky, but with smaller acreage. Some hemp-based companies in Kentucky are doing quite well like Ecofibre. They are innovating and continuing to create new ways to market their products.

Now, if you were to ask me what is the biggest issue facing hemp today, it would be this: a lack of direction from the FDA. Without clear direction from the FDA regarding products containing hemp-derived CBD, large retailers will not carry CBD products, and many business leaders are reluctant to move forward with the development and manufacturing of these products.

The FDA needs to provide regulatory pathways for products containing CBD. The FDA needs to act now. If the FDA gave us direction, more private-sector investment in hemp products would occur, and many well-known consumer brands will have tremendous interest in hemp products. We are waiting on the FDA to do their job. It is worth noting that we are now almost a decade into growing hemp legally again in the United States, and we still don't have proper guidance from the FDA. Meanwhile, we continue our research with the University of Kentucky, Murray State University, Western Kentucky University with over a dozen academic research projects going on right now.

And look, I know we have a long way to go. I am proud of the Hemp Licensing Program that we have built here in Kentucky. We have laid the groundwork for the Commonwealth to be the epicenter of hemp production in the United States like it once was historically. I want to publicly thank our Members of the Kentucky Congressional delegation and all those who helped get hemp where it is at today. In particular, I would like to thank Kentucky's own Doris Hamilton, probably the best known and the best respected state hemp regulatory personnel in the United States.

Thank you for the opportunity to testify before your Committee today, and I will do my best to answer any questions you may have. Thank you.

[The prepared statement of Dr. Quarles follows:]

PREPARED STATEMENT OF HON. RYAN F. QUARLES, PH.D., COMMISSIONER, KENTUCKY DEPARTMENT OF AGRICULTURE, FRANKFORT, KY

Good morning and thank you Chair Plaskett and Ranking Member Baird for the opportunity to speak today. My name is Ryan Quarles and I serve as Kentucky's

Commissioner of Agriculture. I was elected to this office in 2015 and re-elected in 2019. As Commissioner, it is my honor to lead the 218 employees of the Kentucky Department of Agriculture in serving the Commonwealth's 76,000 farm families and the tens of thousands of Kentuckians who work in agriculture and agriculture-related industries.

From 2020 to 2021, I served as president of the National Association of State Departments of Agriculture (NASDA). NASDA is a nonpartisan, nonprofit association that represents the elected and appointed commissioners, secretaries, and directors of the departments of agriculture in all fifty states and four U.S. territories. NASDA grows and enhances American agriculture through policy, partnerships, and public engagement. My experience as a leader in NASDA gave me an opportunity to collaborate with, and learn from, my counterparts in other states in ways that I believe were beneficial to the people of Kentucky.

Since Congress first authorized the states to conduct agricultural pilot programs in the 2014 Farm Bill, Kentucky has been a leader. And indeed, hemp is a crop that connects Kentucky's past to its future. My great-grandfather grew hemp on the banks of the Kentucky River in support of the Second World War effort while my grandfather was serving as a Marine in the Pacific theater. When I took office in 2016, I directed my staff to undertake a top-to-bottom review of Kentucky's hemp program, which was then in its infancy, and to recommend reforms that would enable Kentucky to become the epicenter for hemp production in America. I wanted to take full advantage of the 2014 Farm Bill's authorization for state departments of agriculture to conduct hemp research pilot programs by designing a hemp program that would encourage farmers to grow hemp, and encourage entrepreneurs to build businesses to process hemp into marketable products, right here in the Commonwealth. In short, my strategic objective was to use the 2014 Farm Bill's "research pilot program" to position Kentucky's farmers and processors to compete and win the race to build a robust hemp industry.

I'm proud to say that we accomplished that goal. By the time USDA began its work to develop the administrative regulations that would be necessary to implement the statutory changes in the 2018 Farm Bill, Kentucky's legislative and regulatory framework was widely recognized as one of the best in the nation. We were gratified to see Kentucky's hemp licensing program, and data collected by our partners at the University of Kentucky, cited frequently throughout the final rule that USDA promulgated in January 2021. And the fact that USDA's final rule in many ways conformed to the structure of Kentucky's existing hemp program suggests that USDA's policy approach was built with Kentucky's hemp licensing program in mind. That was gratifying to us, not least because the Federal regulatory framework did not require us to implement drastic changes that would have been disruptive to the community of farmers and entrepreneurs who were already working here.

This summer Kentucky's hemp program is in its ninth year. Like other states, we observed a rapid expansion of acreages from 2015 through 2019, followed by an equally rapid decline beginning with the 2020 growing season. One reason for this decline was that production in the previous years, particularly the 2019 growing season, far outpaced demand. Many farmers ended that year with a hemp harvest for which there was no buyer, even those who started the year with a signed contract. There remains a surplus of harvested hemp from that year. Here is a table depicting Kentucky's experience, in numerical terms, from 2014 to present:

Kentucky Department of Agriculture Hemp Program
Annual Overview

Production Year	University Projects	Processor/ Handlers	Growers	KY Counties with Hemp	Approved Acres	Planted Acres	Harvested Acres	% Grain or Seeds	% Fiber	% CBD/ Cannabinoids	% Grain & CBD	% Seed & Fiber
2014	7	9	20	14	—	33	—	47%	32%	21%		
2015	8	29	99	41	1,742	922	500	47%	6%	47%		
2016	17	45	137	60	4,600	2,300	2,000	34%	6%	60%		
2017	17	49	204	71	12,800	3,200	2.300	36%	5%	27%	32%	
2018	14	72	210	73	16,100	6,700	6,000	18%	4%	61.5%	14%	2.5%
2019	12	200	978	102	60,000	26,500	24,900	2%	4%	92%	0	2%
2020	12	178	970	113	32,000	5,000	4,500	4%	4%	92%	0	0
2021	17	140	450	99	11,500	1,800	1,700	2%	7%	91%	0	0
June 2022	13	93	240	90	5,530	TBD	TBD	TBD	TBD	TBD	TBD	TBD

In addition to the overproduction I mentioned, the hemp industry has been severely hampered by the slowness of the Federal Food and Drug Administration to create a regulatory pathway for hemp-derived cannabinoids, particularly cannabidiol (CBD). Without clear direction from FDA regarding products containing hemp-derived CBD, large retailers will not carry the products and many business leaders are reluctant to move forward with the development and manufacture of CBD-related products. That reluctance, in turn, has dampened industry demand for harvested hemp material.

By contrast, we have been pleased with USDA's prompt and thoughtful approach to hemp policy. As I mentioned previously, we were pleased that USDA took such close interest in Kentucky's existing hemp program while the Federal administrative regulation was being developed. Since then, we have enjoyed a respectful and mutually supportive relationship with the hemp staff at USDA.

We have observed some challenges that warrant continued attention. Under the final rule, USDA's Farm Service Agency (FSA) is tasked with the responsibility for assigning the unique lot numbers for each contiguous planting of a single variety of hemp. We believe that FSA's local staff members need more training to learn how to properly record hemp plantings, especially when the need arises to assign unique sub-field numbers to account for the different varieties of hemp being planted within a single field. Additional training is also needed for accurate reporting of indoor hemp production. Currently, we see that when a producer plants multiple varieties in a single field or indoor facility, the lot number is often assigned incorrectly. Moreover, once a lot number has been assigned by FSA, those numbers are not reliably transferring electronically to the USDA–AMS Hemp Program's software, Hemp eManagement Platform (HeMP). Without the appropriate lot numbers in the USDA HeMP system, states and laboratories are unable to properly identify lots or report THC testing results back to USDA. In time, we are confident that this problem will be resolved.

Looking ahead, we have some suggestions for improvements to hemp policy at the Federal level that would improve matters in Kentucky and other states. For one, we believe that laboratories need not be DEA-registered, but they should be required to attain ISO 17025 accreditation, with total THC on a dry weight basis as part of their scope, prior to offering THC testing services for compliance purposes.

Should Congress consider revising the Federal definition of hemp plants, we urge it to raise the THC threshold from 0.3% to 1.0%. At the same time, it would be appropriate for the new 1.0% limit to include not only delta-9 THC, but every other THC isomer which could have an intoxicating effect on consumers, including without limitation synthetically created delta-8, delta-10, delta-7, HHC, and others. Embracing a "total THC" standard instead of a "delta-9 THC only" standard will establish a threshold which better reflects the material's true intoxicating potential.

In addition, Congress should consider adopting a separate definition for consumer-ready hemp products. The current law's definition is focused on the chemical compounds within the hemp plant at the time of its harvest in the field or greenhouse; it is not a useful yardstick for measuring the intoxicating potential of consumer products that are intended for human consumption such as gummies, liquids, vapes, or "smokeables." For consumer products, we believe a separate legal standard is needed. And that product standard needs to focus on quantities, not percent concentration by weight.

To illustrate, a candy bar weighs about 1.76 ounces, which converts to 50,000 milligrams (mg). If that same candy bar's THC concentration was 0.3%, it would contain 150 mg of THC. By comparison, a typical "adult-use" THC candy bar made with marijuana contains only 100 mg of THC and is recommended to be consumed in four or five time-separated doses. Some literature recommends that chronic pain patients should start with a 2.5 mg dose of THC and consume no more than 40 mg of THC each day-considerably less than the 150-mg candy bar that could be made from hemp-derived THC and yet remain below a 0.3% THC concentration limit.

For this reason, if Congress's goal is to eliminate or at least mitigate the intoxicating effects of consumable products made from hemp, we believe that it makes little sense to regulate a consumer product's THC content in percentage or concentration terms. The better approach would be to limit THC content in terms of quantity, like milligrams, with a numerical cap in milligrams that is sufficiently modest as to eliminate or at least mitigate its intoxicating effects.

In Kentucky and other states, there is considerable confusion about whether existing Federal law's definition of hemp serves to legalize synthetic compounds that were made in a laboratory. I am referring to delta-8 THC products as well as many other newer products, many of which contain synthetic THC levels and byproducts in levels that are harmful to consumers' health, but also other synthetic compounds such as such as delta-10 THC, THC–O, HHC, and others which we expect to proliferate in the coming months and years unless Congress draws a clear line separating natural hemp products (containing only those chemical compounds which were extracted from the hemp plant) from synthetic products (which contain intoxicating chemicals created in a laboratory). A good starting point would be a revised definition which retains the word "extracts" but eliminates the word "derivatives"—because that word has been at the center of litigation in Kentucky and other jurisdictions.

There has been some discussion about whether it would be advisable to exclude fiber and grain hemp crops from the regulatory and testing requirements of the Federal hemp production framework. It is true that most certified grain and fiber seed varieties have proven to be THC-compliant and stable, but there is no guarantee that every future fiber and grain crop will be produced from compliant varieties. Indeed, there are some fiber and grain varieties which are not compliant. Here in Kentucky we have tested and subsequently prohibited some of those varieties from our program due to excessive THC content. For that reason we believe all hemp, regardless of its intended application, must be subject to THC testing.

Looking to the future, we expect that in the coming years we will see modest increases in the number of acres planted, at least until FDA provides the regulatory pathways for products containing CBD and other non-intoxicating cannabinoids. I remain proud of the hemp licensing program we have built here in Kentucky and believe that we have laid the groundwork for the Commonwealth to emerge as a lasting center of hemp production in the United States. I want to thank the Members of Kentucky's Congressional delegation for their sustained interest in this crop and the steps they have taken to foster Kentucky's hemp industries. Senator McConnell in particular has been a tremendous partner during my tenure as Kentucky's Agriculture Commissioner, and I want to thank him and his staff for their partnership in advancing Federal hemp policy in a way that is beneficial to Kentucky and the nation.

Thank you for the opportunity to appear today. I will do my best to answer any questions you may have for me.

ATTACHMENT

Hemp, Kentucky, and the Law

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RYAN QUARLES*

Introduction

On March 26, 1810, fresh off of a bloody duel, Henry Clay, Kentucky's native son, hemp farmer, and future Speaker of the United States House of Representatives, stood on the floor of Congress for one of his very first speeches.[1] Clay vigorously advocated that the United States Navy give preference to American made hemp sails and rope.[2] Threatened by foreign markets, Clay sought to boost domestic hemp prices to provide a cash crop for the farmers of central Kentucky.[3] As fate would have it, precisely 208 years later *to the day* United States Senate Majority Leader Mitch McConnell stood on the grounds of the Kentucky Department of Agriculture ("KDA") and made international headlines by announcing his plans to legalize hemp for the first time in over seventy years of dormancy.[4] Like Clay, he too sought to fight foreign hemp markets and give the farmers of his home state an alternative cash crop that once thrived in Kentucky.[5]

Rarely do two leaders of each chamber of Congress intersect on policy 2 centuries apart, much less on the exact same crop. But, that is the story of hemp: a crop full of contradictions, complexities, and myths which span from colonial times to the 21st century.[6] Since becoming a Commonwealth in 1792, Kentucky has been defined by its rich farming heritage and is known throughout the world for its agricultural products such as thoroughbred race horses, tobacco, Kentucky Fried Chicken, bourbon, and yes, hemp.[7]

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[1] *Henry Clay, The Papers of Henry Clay, Volume 1: The Rising Statesman,* 1797–1814 459 (James F. Hopkins, *et al.* eds., 1959).

[2] *Id.*

[3] *See id.* at 460.

[4] Mike Debonis, *Mitch McConnell renews push to legalize industrial hemp,* THE WASH. POST (March 26, 2018, 2:30 p.m.), *https://www.washingtonpost.com/news/powerpost/wp/2018/03/26/mitch-mcconnell-renews-push-to-legalize-industrial-hemp/* [*https://perma.cc/TLK3-FYCR*].

[5] *See generally id.* (discussing Mitch McConnell's desire to help hemp cultivate in his home state of Kentucky).

[6] *See generally* James F. Hopkins, *A History of the Hemp Industry in Kentucky* (1998) (examining the long history of hemp starting in the colonial times up until the 21st century).

[7] James C. Klotter & Freda C. Klotter, *A Concise History of Kentucky* 1–2 (2008).

Kentucky's history is entwined with the history of hemp.[8] When Archibald McNeill first recorded growing the crop outside of Danville in 1775, it was quickly determined that Kentucky's rich soil and climate made for perfect growing conditions, just as it had for tobacco.[9] Many Kentucky farmers, including my great-grandfather, grew hemp for rope during World War II.[10] In fact, the U.S. Department of Agriculture ("USDA") produced a promotional video in 1942 encouraging farmers to grow hemp.[11] In it, a patriotic narrator describes how "in Kentucky, much of the seed hemp acreage is on river bottom lands . . . along the Kentucky River gorge."[12] With more than 26,000 acres of hemp harvested in Kentucky in 2019,[13] it's clear that hemp is a crop that connects our past to our future.[14]

Hemp is frequently in the news, especially following the passage of the 2018 Farm Bill, which included *The Hemp Farming Act of 2018.*[15] As one can imagine, "legal issues abound when discussing the laws and regulations governing cannabis cultivation and marketing in the United States."[16] To give an overview of the laws, history, and future of Kentucky's hemp program, this Comment begins by legally defining hemp in Section I. Section II examines the return of hemp to Kentucky through the Kentucky Department of Agriculture's hemp program and the Federal Government's regulatory oversight of the hemp industry. Section III discusses the response to the obstacles that resulted from the administrative transition in the Office of the Kentucky Agriculture Commissioner. Section IV explores Kentucky's progress in expanding the program to benefit farmers and businesses since 2016. Finally, Section V concludes by exploring what the future entails for hemp.

I. Hemp's Legal Origin and Definition

Before diving into the laws and competing frameworks which guide hemp production, one must first know the single most important law concerning the crop: its definition. Unlike any other crop grown in the United States, hemp is defined through an [A]ct of Congress rather than by farmers, agronomists, crop researchers, or biologists.[17] This was not always the case. Hemp cultivation thrived in Kentucky from 1775 through 1937 untethered, untangled and unimpaired by Federal law until the late 1930's.[18] During this golden age, production surged in the central Kentucky region for historical uses ranging from paper, clothing, textiles, rope making, and even livestock feed.[19] As steamboats replaced traditional sailing ships and the invention of competing fibers such as nylon, the demand for hemp waned during the Great Depression to historic lows.[20]

On the heels of dozens of states adopting the *Uniform State Narcotics Act,*[21] and, for reasons not entirely clear and still subject to cannabis folklore, Congress passed the *Marihuana Tax Act of 1937,*[22] effectively ending hemp production in America.[23] Without distinguishing between hemp and marijuana, the new law's cost-prohibitive tax not only rendered hemp cultivation unprofitable, but it also gave Federal prosecutors a right of action to prosecute those cultivating for illicit use.[24] It was not until an acute demand for rope by the United States Navy after the outbreak of World War II did the need for hemp cultivation necessitate a brief carve out exemp-

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[8] *See* Hopkins, *supra* note 6.

[9] *Id.* at 69.

[10] *See generally id.* (discussing the need for rope during World War II and how it was made from hemp grown by Kentucky farmers).

[11] *Hemp for Victory* (U.S. Dep't. of Agric. 1942).

[12] *Id.*

[13] Katie Pratt, *Despite trade concerns, Kentucky agricultural receipts hold steady for third year, net incomes up,* NORTHERN KENTUCKY TRIBUNE (Dec. 8, 2019), *https://www.nkytribune.com/2019/12/despite-trade-concerns-kentucky-agricultural-receipts-hold-steady-for-third-year-net-incomes-up/* [*https://perma.cc/U7F5-3X6Y*].

[14] *See* Klotter & Klotter, *supra* note 7.

[15] Hemp Farming Act of 2018, H.R. 5485, 115th Cong. (2018).

[16] Ryan Quarles, *Hemp: Connecting Kentucky's Past with its Future,* 1 J. OF AGRIC. HEMP RES. 1, 2 (2019).

[17] Renée Johnson, Cong. Research Serv., *Defining Hemp: A Fact Sheet* 1 (2019).

[18] Hopkins, *supra* note 6.

[19] *Id.*

[20] *Id.* at 193.

[21] Uniform State Narcotic Drug Act, 21 U.S.C. §§ 1201–1204 (1934) *repealed by* Anti-Drug Abuse Act of 1988, 102 Stat. 4181.

[22] Marihuana Tax Act of 1937, Pub. L. No. 75–238, 50 Stat. 551, overturned by *Leary* v. *United States* 395 U.S. 6 (1969) and repealed by Comprehensive Drug Abuse Prevention and Control Act of 1970, Pub. L. No. 91–513, 84 Stat. 1236, 1292 (1970).

[23] Hopkins, *supra* note 6.

[24] Marihuana Tax Act of 1937, Pub. L. No. 75–238, §§ 4–6, 50 Stat. 551, *overturned* by *Leary* v. *United States* 395 U.S. 6 (1969) and *repealed by* Comprehensive Drug Abuse Prevention and Control Act of 1970, Pub. L. No. 91–513, 84 Stat. 1236, 1292 (1970).

tion from the tax.[25] Administered by the USDA and spurred by the "Hemp For Victory" campaign, thousands of tax exempt licenses to grow hemp were given to increase production.[26] Many of these licenses went to Kentucky farmers.[27]

Congress did not revisit the legal definition of hemp again until 1970, after the striking down of the *Marihuana Tax Act of 1937* through *Leary* v. *United States.*[28] In response, Congress passed the *Comprehensive Drug Abuse Prevention and Control Act of 1970,* which officially classified hemp as a Schedule 1 narcotic, indistinguishable from marijuana.[29] However, hemp research did not cease internationally and by August 1976, the first known modern definition of hemp emerged as "a concentration of 0.3 [percent] Delta-9-THC (dry weight basis) in young, vigorous leaves of relatively mature plants as a guide to discriminating two classes of plants."[30] Admittedly an arbitrary distinction, the 0.3 percent THC (Tetrahydrocannabinol, the psychoactive compound found in cannabis) threshold soon became an internationally adopted measurement separating hemp from its illicit cousin.[31] In the 2014 Farm Bill,[32] Congress adopted a very similar definition of hemp to mean "the plant *Cannabis sativa* L. and any part of such plant, whether growing or not, with a delta-9 tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis."[33] No other crop is known to have such a complicated history and legally constructed definition, which both adds to the lure and complexity of hemp's reintroduction.[34]

II. The Hemp Comeback Begins: 2013–2014

A. Kentucky Senate Bill 50

The modern hemp revitalization journey began with various state legislative bills which sought to reintroduce the crop through a state regulatory framework, pending approval from the Federal Government.[35] After several attempts, the 2013 General Assembly enacted KY Senate Bill 50, the product of considerable negotiations between the two legislative chambers.[36] The Senate's initial version of the bill would have vested primary responsibility for the hemp program's design and development in the Kentucky Department of Agriculture with oversight from the Commissioner of Agriculture.[37]

After securing Senate passage by a vote of 31–6 on February 14, 2013, the bill went to the House of Representatives.[38] By means of a House floor amendment, the House of Representatives changed S.B. 50 to remove much of the Department of Agriculture's discretionary authority envisioned in the Senate's version.[39] Instead, greater powers were placed in the hands of the Kentucky Industrial Hemp Commission and the Kentucky State Police.[40] The House's amendment placed the authority to promulgate administrative regulations (*i.e.,* to design the hemp program's structure), and to issue grower's licenses, in the hands of the Commission.[41] Criminal background checks would be performed by the Kentucky State Police; any applicant with a felony drug conviction within the previous 10 years would not be eligible for licensure.[42] The House floor amendment also created a state-law definition of "hemp" that was expressly pegged to whatever tetrahydrocannabinol ("THC") levels Congress relied upon in its definition of "marijuana" in the Federal Controlled Substances Act, 21 U.S.C. 801 *et seq.*[43]

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[25] Hopkins, *supra* note 6.
[26] *Hemp History,* Hemp Industries Ass'n., *https://www.thehia.org/hisotry* [*https://perma.cc/E4FJ-VBZZ*].
[27] *Id.*
[28] *Leary* v. *United States,* 395 U.S. 6 (1969).
[29] Comprehensive Drug Abuse Prevention and Control Act of 1970, 21 U.S.C. § 801 (1970).
[30] Ernest Small & Arthur Cronquist, *A Practical and Natural Taxonomy for Cannabis,* 25 TAXON 405, 408 (1976).
[31] Johnson, *supra* note 17.
[32] Agricultural Act of 2014, Pub. L. No. 113–79, 128 Stat. 649 (codified at 7 U.S.C. § 5940).
[33] *Id.* at § 7606.
[34] *See* Johnson, *supra* note 17.
[35] Rich Mundell & D.W. Williams, *An Introduction to Industrial Hemp & Hemp Agronomy,* Ky. Coll. of Agric., Food, & Env't., July 2018), at 1, *http://www2.ca.uky.edu/agcomm/pubs/ID/ID250/ID250.pdf* [*https://perma.cc/ZAN7-AA5D*].
[36] S.B. 50, 2013 Gen. Assemb., Reg. Sess. (Ky. 2013).
[37] *See* S.B. 50, 2013 Gen. Assemb., Reg. Sess. (2013).
[38] *Id.*
[39] *See id.*
[40] *See id.*
[41] *See id.*
[42] *See id.*
[43] *See id.*

On March 26, 2013 (203 years to the day after Henry Clay's speech), S.B. 50, as amended by the House, was approved by a vote of 88 to 4, including my vote of support as a former legislator.[44] Twelve days later, on April 7, 2013 the bill became law.[45] In so doing, the Kentucky Legislature had exercised the extent of its authority to facilitate hemp farming experimentation.[46] Without action from Congress, however, the longstanding Federal prohibition against the cultivation of cannabis would keep things at a standstill.

B. Federal Oversight Issues

In early 2014, Congress included within the Agricultural Improvement Act (the "Farm Bill") a two-page section that created an opportunity for state-level "agricultural pilot programs" to study the "growth, cultivation, or marketing" of hemp.[47] Led by Senator McConnell and Kentucky's Congressional delegation, the 2014 Farm Bill allowed farmers to cultivate hemp, "a crop whose history was as old as the Commonwealth itself."[48]

The "pilot program" concept Congress adopted with the 2014 Farm Bill had important implications for how Kentucky's hemp program would develop.[49] There were at least two notable components. The first was Congress's new definition of hemp as "the plant *Cannabis sativa* L. and any part of such plant, whether growing or not, with a delta-9 tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis."[50]

Second, unlike the "program of licensure" for individual farmers that the 2013 General Assembly had authorized with S.B. 50, Congress did not create a Federal system of licensure for private citizens.[51] Indeed, Congress authorized only "agricultural pilot programs" conducted by a state department of agriculture and institutions of higher education.[52]

Soon after President Obama signed the 2014 Farm Bill into law, the most urgent challenge was seed acquisition. Where would KDA and its program participants obtain the planting materials they needed? In early May, KDA learned that a quantity of hemp seeds were being detained by U.S. Customs and Border Protection agents at the United Parcel Service cargo facility in Louisville.[53] With the planting season already underway, KDA swiftly filed suit in U.S. District Court for the Western District to obtain the seeds.[54] The dispute ended with an agreement that the hemp seeds would be allowed entry by a DEA import permit.[55]

By the end of May 2014, KDA had signed a "memorandum of understanding" with a number of farmers wishing to grow hemp within a principal-agent relationship with KDA. KDA also coordinated with representatives of several public universities in Kentucky.

C. The Success of Hemp

The first planting season was limited in scope because of delays in seed acquisition and the challenges inherent in working with a new crop.[56] Of the 33 acres that were planted in 2014, there was moderate success.[57]

The second year saw more success. In 2015, 922 acres were planted, with more than 500 acres harvested.[58] One notable development from the 2015 growing season

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[44] KY. General S.B. 50, 2013 Gen. Assemb., Regular Session (Reg. Sess. (Ky. 2013).
[45] *Id.*
[46] *Id.*
[47] *See* 7 U.S.C.S. § 5940 (LexisNexis 2014).
[48] Quarles, *supra* note 16, at 1.
[49] *See* 7 U.S.C.S. § 5940. (LexisNexis 2014).
[50] *Id.* at § 5940(a)(2).
[51] *See id.* at § 5940.
[52] See id. at § 5940(a)(1).
[53] Press Release, Ky. Dep't. of Agric., *Industrial Hemp Seeds Arrive in Frankfort, Ready for Pilot Research Programs* (May 23, 2014), *https://www.kyagr.com/Kentucky-AGNEWS/press-releases/Industrial-hemp-seeds-arrive-in-Frankfort-ready-for-pilot-research-programs.html* [*https://perma.cc/LB8R-YARJ*].
[54] *See* Janet Patton, *Kentucky Agriculture Department, DEA reach deal on Hemp Seeds; Planting Could Come hemp seeds; planting could come soon,* HERALD LEADER (May 21, 2014, 1:40 PM), *https://www.kentucky.com/news/business/article44489994.html* [*https://perma.cc/J538-QLP6*].
[55] *See* Press Release, *Ky. Dep't. of Agric., State Ag. Department, Federal Government Reach Accord on Importation of Hemp Seeds* (Aug. 14, 2014), *https://www.kyagr.com/Kentucky-AGNEWS/press-releases/State-ag-department-federal-government-reach-accord-on-importation-of-hemp-seeds.html* [*https://perma.cc/DDK6-94Y3*].
[56] *See Industrial Hemp Research Pilot Program Overview,* KY. Dep't. of Agric., *https://www.kyagr.com/marketing/hemp-overview.html#* [*https://perma.cc/73ZR-PVD4*].
[57] *Id.*
[58] *Id.*

was the emergence of a new application of the plant—extracting certain chemical compounds, known as cannabinoids, from the floral part of the plant—alongside the traditional components of fiber and grain.[59] One of those cannabinoids was cannabidiol ("CBD"), a chemical compound that was said to hold great promise in health and wellness products.[60] To the surprise of many, almost half of the acreage planted in 2015 was attributed to farmers growing hemp for CBD rather than grain or fiber.[61] Whether CBD and other cannabinoids would prove commercially viable—and what CBD's legal status was under Federal law—remained unclear.

III. Challenges at the Start of a New Administration

When I took office as Agriculture Commissioner in 2016, Kentucky's hemp program remained in its infancy.[62] Even then, it was evident that changes were needed.[63] Although S.B. 50 placed responsibility for hemp program oversight and management on the Industrial Hemp Commission, its 26-member board had not convened for a meeting since May 2014.[64] With no staff support, the Commission was unable to carry out its duties, which meant that responsibility fell to KDA and its employees to keep the program running throughout the latter half of 2014 and all of 2015.[65]

Kentucky's hemp program needed change to operate effectively and to better serve the growing number of farmers and entrepreneurs interested in hemp.[66] In 2016, the Kentucky Department of Agriculture reviewed the hemp program and worked with staff to refine methods already in place.[67]

As Commissioner of Agriculture, the goal was to create a healthy and productive hemp program that would make Kentucky the center of hemp production.[68] While other states were reluctant to adopt hemp, the KDA aimed to "use the first-mover advantage" to better serve farmers and researchers in the state.[69] The idea was to prepare the state for future Federal approval of hemp, allowing Kentucky to be more attractive to commercial investments around the world and give Kentucky farmers a potential alternative crop.[70]

A. A Plan for Kentucky

Three principles guided the KDA team's work. First, it was imperative to build a strong, trusting, and mutually supportive relationship with the Kentucky State Police and other law enforcement agencies. Second, the KDA needed to find ways to reduce the paperwork and administrative burdens that were required of program participants and KDA's own employees. Third, the KDA needed to empower our growers and processors. Above all, I wanted the organization to commit to a mindset of continuous process-improvement as we aspired to be the best program in America.

The first step was to create a clear written document that farmers and entrepreneurs could read to understand the "rules of the road." Because S.B. 50 had vested authority to promulgate administrative regulations in the now-dormant Industrial Hemp Commission, which had not met in years, KDA itself could not promulgate regulations without first seeking a change in law from the General Assembly.[71] In anticipation of that step, KDA's staff dedicated hundreds of hours to hammering out a detailed policy guide that could fill the gap in the meantime. The product of the deliberations was a 25-page *2017 Policy Guide,* which set the parameters for the upcoming year's growing season and served as a transparent prototype for future administrative regulations.[72] For the first time, a member of the public could read, in black-and-white text, what the rules of the road would be.[73]

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[59] *See* U. KY. C. Agric., *UK Industrial Hemp Research Progressing in Second Year,* Ky. Dep't. of Agric., *https://www.kyagr.com/Kentucky-AGNEWS/2015/UK-industrial-hemp-research-progressing-in-second-year.html* [*https://perma.cc/M4PU-SMCV*].
[60] *Id.*
[61] *Id.*
[62] Quarles, *supra* note 16, at 2.
[63] *Id.*
[64] *See* 2013 Ky. Acts 14, § 3.
[65] *See id.*
[66] Quarles, *supra* note 16, at 2.
[67] *Id.*
[68] *Id.*
[69] *Id.*
[70] *Id.*
[71] *See* 2013 Ky. Acts 134.
[72] 302 Ky. Admin. Regs. § 50:030 (Ky. Dep't. of Agric., 2018) (the *2017 Policy Guide* was subsequently promulgated as a regulation).
[73] *See id.*

The next step was to ask the General Assembly for some help in revising Kentucky's legislative framework. Senate Bill 50 was not working for at least three major reasons.[74] The first reason was the structural misalignment between state law and Federal law.[75] While the 2013 General Assembly had enacted S.B. 50 with the expectation that Congress would adopt a system of individualized licensure of farmers,[76] the 2014 Farm Bill's "agricultural pilot programs" had restricted participation to state departments of agriculture and universities.[77]

The second reason arose from structural deficiencies within Senate Bill 50.[78] For instance, that the Industrial Hemp Commission had not held a meeting since May 2014, in part because it was a major undertaking simply to achieve a simple-majority quorum of its 26 members.[79] Additionally, because the Commission had no full-time staff support, it had proven almost impossible for that body to maintain any continuity of effort over time. Responsibilities that should have been assigned to an executive-branch agency with full-time employees, such as the promulgation of administrative regulations, had instead been placed in the Commission's hands.[80]

The third reason S.B. 50 was deficient was that it did not answer important public-policy questions.[81] These included concerns about the handling of hemp after harvest, the retention of floral materials by the public, and possession of products, especially live plants and seeds, by those not included in the pilot program.[82] None of these questions were answered by S.B. 50.

IV. Legislative Changes Lead to Explosive Growth

At the KDA's request, the 2017 General Assembly passed Senate Bill 218 which resulted in widespread changes to the hemp program.[83] The enactment of S.B. 218 allowed the hemp program to grow in ways that would not have been possible without legislative support.[84] The bill contained several important features that emerged from the 2016 review, including the transfer of powers from the Industrial Hemp Commission to the KDA.[85] This change allowed the KDA to create administrative regulations and brought about a new advisory board, the Industrial Hemp Advisory Board.[86] The board was purely advisory in nature and allowed KDA to receive input from those in the industry.[87] The bill created a clear distinction between those needing licensing.[88] This separates those who grow, handle, or process the plants, seeds, leaf materials and floral material from those that buy a finished product or own an already harvested material.[89]

Soon after the Governor signed S.B. 218 into law, KDA went to work to formulate the administrative regulations that would give program participants an even clearer view of how the licensure program would work.[90] This work culminated in the promulgation of a separate guide for licensed growers, licensed processors, and affiliated university researchers.[91]

Thanks to the framework provided by statutory and regulatory guidelines, the state successfully increased hemp production. In 2018, Kentucky farmers planted 6,700 acres of hemp, more than double what was previously planted.[92] The number of licensed processors increased from 210 in 2018 to almost 1,000 in 2019, with the number of planted acreage also likely to double.[93]

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[74] *See* S.B. 50, 2013 Gen. Assemb., Reg. Sess. (Ky. 2013).
[75] *See id.; see also* Quarles, *supra* note 16, at 2.
[76] *See* S.B. 50, 2013 Gen. Assemb., Reg. Sess. (Ky. 2013).
[77] 7 U.S.C.S. § 5940 (LexisNexis 2014).
[78] *See* S.B. 50, 2013 Gen. Assemb., Reg. Sess. (Ky. 2013); *see also* Quarles, *supra* note 16, at 2.
[79] Quarles, *supra* note 16, at 2.
[80] *Id.* at 2–3.
[81] *See* S.B. 50, 2013 Gen. Assemb., Reg. Sess. (Ky. 2013); *see also id.* at 3.
[82] Quarles, *supra* note 16, at 3.
[83] *See* 2017 Ky. Acts 45, §§ 1–14.
[84] Quarles, *supra* note 16, at 3.
[85] *See* Ky. Rev. Stat. § 260.862 (2017).
[86] *See id.; see* Ky. Rev. Stat. § 260.860 (2017).
[87] *See* Ky. Rev. Stat. § 260.860 (2017).
[88] *See* Ky. Rev. Stat. § 260.858(3) (2017).
[89] *Id.*
[90] *See* S.B. 218, Regular Session (2017 Gen. Assemb., Reg. Sess. (Ky. 2017).
[91] *See* 302 Ky. Admin. Regs. § 50:020 (Ky. Dep't. of Agric., 2018); 302 Ky. Admin. Regs. § 50:030 (Ky. Dep't. of Agric., 2018); 302 Ky. Admin. Regs. § 50:040 (Ky. Dep't. of Agric., 2018).
[92] *Kentucky Hemp Industry's Economic Impact Showed Explosive hemp industry's economic impact showed explosive growth in 2018,* SENTINEL-ECHO (Mar. 22, 2019), *https://www.sentinel-echo.com/community/kentucky-hemp-industry-s-economic-impact-showed-explosive-growth-in/article_85ce450d-61e1-5c65-8d4a-fe3229362357.html* [*https://perma.cc/BTQ3-RH99*].
[93] *Id.*

The resulting economic impact numbers spoke volumes.[94] Gross product sales grew from $16.7 million in 2017 to $57.7 million in 2018.[95] Payments to farmers also increased to $17.5 million in 2018, nearly double the $7.5 million recorded in 2017.[96] Full time jobs more than tripled in that time frame as well, growing from eighty-one to 281 positions.[97] More than $100 million has been invested by Kentucky processors.[98] Sales of Kentucky hemp products reached $193.4 million in 2019.[99] Despite these economic numbers, there exists major growing pains in the industry that could affect the stability of emerging hemp markets in the coming years.

V. Another Big Step Forward

In March 2018, Senate Majority Leader Mitch McConnell, in a joint press conference with KDA, introduced the Hemp Farming Act of 2018.[100] This bill was later included in the 2018 Farm Bill.[101]

A. The 2018 Farm Bill

The 2018 Farm Bill, championed by Leader McConnell, allows Kentucky's hemp industry to expand because it makes important changes to Federal law.[102] First, the bill removes hemp from the Controlled Substances Act of 1970.[103] Second, it allows hemp farmers to participate in USDA research programs and to receive Federal crop insurance.[104] Third, states may not interfere with interstate shipments.[105]

The farm bill took a "cooperative federalism" approach and allowed individual state's departments of agriculture to regulate hemp in their jurisdictions.[106] States submitted a focused plan specially focused on each state's needs.[107] The state must meet a federally mandated minimal criteria, including sampling and testing programs, but can otherwise regulate hemp to serve the state's best interest.[108]

Conclusion

Fortunately for Kentucky's farmers and processors, the existing hemp program already meets the Federal requirements, which means that our program can continue without significant disruptions. It also meant that I was able to attend the White House signing ceremony in December 2019 and present Kentucky's State Plan, the very first in the nation, to USDA Secretary Sonny Perdue just moments after President Trump signed the bill into law.[109] To date, numerous states have modeled their hemp programs on the framework we have built here in Kentucky.[110]

Recently, even more legal complexities have emerged as the USDA published an interim final rule ("IFR") to guide the implementation of the hemp provisions of the

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[94] Quarles, supra note 16, at 3.
[95] SENTINEL-ECHO, *supra* note 92.
[96] Quarles, *supra* note 16, at 3.
[97] *Industrial Hemp Research Pilot Program Overview, supra* note 56; Doris Hamilton, *Industrial Hemp Research Pilot Program,* Ky. Dep't. of Agric. (Oct. 11, 2018), *https://www.kyagr.com/marketing/program_id/70/documents/HEMP_2019HempApplicantMeeting10-11-18_000.pdf* [*https://perma.cc/GT2U-Z8HS*].
[98] *See Kentucky Hemp Industry's Economic Impact, supra* note 92; *see also Hemp processing in U.S. state of Kentucky sees flurry of investment,* HEMP TODAY (Aug. 1, 2019), *https://hemptoday.net/kentucky-hemp-investment/* [*https://perma.cc/R6EL-M82T*].
[99] Grace Schneider, *More than 150 Kentucky Farmers Holding Last Year's Hemp Crop After Disastrous Last Season,* COURIER JOURNAL (June 1, 2020 7:04 a.m.), *https://www.courier-journal.com/story/news/local/2020/06/01/kentucky-hemp-farmers-steer-clear-after-2019-tumult/5282812002/* [*https://perma.cc/9JMG-8X5P*].
[100] *See Senator McConnell and Commissioner Quarles Announce Hemp Legislation,* Ky. Dep't. of Agric. (Mar. 26, 2018), *https://www.kyagr.com/KYAg-News/2018/Senator-McConnell-and-Commissioner-Quarles-Announce-Hemp-Legislation.html* [*https://perma.cc/67MA-NNCT*].
[101] Harold B. Hilborn, *2018 Farm Bill Legalizes Hemp, but Obstacles to Sale of CBD Products Remain,* NAT'L L. REV. (Mar. 5, 2019), *https://www.natlawreview.com/article/2018-farm-bill-legalizes-hemp-obstacles-to-sale-cbd-products-remain* [*https://perma.cc/PTR8-5XKG*]
[102] *See* Agriculture Improvement Act of 2018, Pub. L. No. 115–334 § 12619 (2018).
[103] *See id.* § 12619.
[104] *See id.* §§ 7129, 7501, 11102 at 4795, 4819, 4919–20.
[105] *See id.* § 10114 at 4920.
[106] *See id.* § 297(B), at 4909–12.
[107] *See id.*
[108] *See id.* § 10113 at 4908 (creating a new Section 297B, "State and Tribal Plans").
[109] Tom Latek, *KY leaders join Trump at Farm Bill signing, legalizing industrial hemp,* KENTUCKY TODAY (Dec. 20, 2018, 6:19 p.m.), *http://kentuckytoday.com/stories/ky-leaders-join-trump-at-farm-bill-signing-legalizing-industrial-hemp,16857* [*https://perma.cc/ZNP6-4W9U*].
[110] Tanner Hesterberg, *State officials burn nearly $20,000 in hemp that failed standard, WKYT* (Apr 133, 2017 3:20 p.m.) *https://www.wkyt.com/content/news/State-officials-to-burn-nearly-20000-in-hemp-that-barely-failed-standard-419334524.html* [*https://perma.cc/D4VA-PKSH*].

2018 Farm Bill.[111] As state departments of agriculture navigate this rule, challenges still exist within the hemp industry: inevitable FDA oversight, EPA crop technology approvals, hesitation by banks to lend with legal hemp companies, variations in THC testing protocols, and even confusion about interstate commerce of hemp. It seems as though just as much work is left to be done now as did the 70-year effort to legalize hemp. It is my vision that one day hemp will be treated much the same way other agricultural commodities are in the United States. Regardless, Kentucky will develop a long-term hemp market once the dust settles on the legalese which has impeded its growth for almost a century.

Despite these growing pains, "Kentucky continues to lead the way with hemp, just as it did when my great-grandfather grew it generations ago on the banks of the Kentucky River."[112]

The CHAIR. Thank you very much, Doctor.

And now for our final witness, Ms. Greenberg, please begin when you are ready.

STATEMENT OF KATE GREENBERG, COMMISSIONER, COLORADO DEPARTMENT OF AGRICULTURE, BROOMFIELD, CO

Ms. GREENBERG. Thank you, Chair Plaskett, for the invitation to testify before you today. My name is Kate Greenberg. I serve as the Colorado Commissioner of Agriculture and was appointed to this role by Governor Jared Polis in 2018. As Commissioner, I have the privilege of leading the Colorado Department of Ag and our more than 300 employees dedicated to supporting the nearly 40,000 farm and ranch families and almost 200,000 workers across Colorado.

Agriculture is one of the top drivers of our economy and workforce, and it is essential to who we are as a state. We have bold goals at the Department of Ag to build the future of agriculture, including building economic and supply chain resilience, advancing voluntary stewardship, supporting future generations, and furthering animal health and welfare. The hemp industry plays an important role in all of these goals.

Colorado has been fostering the growth of the hemp industry for the better part of a decade. These efforts are exemplified through the Colorado Hemp Advancement and Management Plan, or CHAMP for short. The CHAMP initiative, which we launched in 2019, was a collaborative effort involving more than 200 stakeholders, state agencies, local and Tribal governments, and industry experts. The CHAMP report, which is provided in my written testimony, contains key deliverables addressing the regulation of hemp across the entire supply chain, from research and development to manufacturing and banking and insurance. It also informed the formation of the Colorado State Hemp Plan, which was approved by USDA and implemented on January 1st of this year.

Like most states, following the 2018 Farm Bill, registered hemp acreage in Colorado increased sharply to 87,408 acres in 2019. This was a dramatic uptick from the 1,800 registered acres in 2014. Since 2019, however, we have seen a dramatic decrease, as many states have, down to just under 3,700 registered acres.

There are many factors contributing to the current drop in acreage. Overproduction in 2019 led to a rapid saturation of the market, a market at that point which was solely reliant on CBD. In

[111] *See* 7 CFR § 990 (2020).
[112] Quarles, *supra* note 16, at 4.

addition, while the 2018 Farm Bill and USDA Final Rule opened up new opportunities for hemp production, they also placed additional burdens on producers. These burdens, including much higher sampling and testing fees, background checks, and duplicative FSA acreage reporting may also be contributing factors to this current decline. In a recent survey, many producers also stated that increasing the hemp THC limit to one percent would encourage further production.

Since the full implementation of our state plan in January of this year, Colorado has also taken on additional responsibilities. We have expanded our testing from 30 percent to 100 percent of all hemp lots. We have approved 18 performance-based sampling plans, including research and disposal plans. Additionally, we have also trained and certified 16 authorized samplers throughout the state.

Currently in Colorado, as in many other states, 100 percent of regulatory program costs are paid by producers through registration fees. We are facing similar challenges as other states that have turned their programs back to USDA and making our program financially sustainable, particularly in a fluctuating environment.

USDA staff have been very responsive to our concerns, as we have requested greater flexibility from them through the rulemaking process, and we very much value their partnership. However, there are certain ways in which Congress can provide support to Federal agencies to allow for greater flexibility and improve our state-run hemp programs. Specifically, we have five recommendations for this Committee to consider. The first one is to remove the DEA requirements for testing labs. Our state-of-the-art laboratory began the process of obtaining DEA certification in 2019. However, as of this hearing, we still await their approval. This unnecessary burden can be removed by the help of Congress.

Number two, allow the use of certified seed as an alternative to the strict testing requirement. We believe there is much to learn in this regard, and Colorado is a willing partner to explore what is possible.

Number three, remove background check requirements. Hemp should be treated like the agricultural commodity it is, and producers should not be treated as potential criminals for the production of illegal hemp crop.

Number four, establish a Federal grant program to support state hemp programs. A grant program would help states continue to manage our own hemp programs while taking some of the burden off of USDA.

And last, number five, support Federal agencies, particularly the FDA, in accelerating the regulatory process to allow the use of hemp as feed.

In Colorado, we commit every day to helping build a vibrant, resilient future for Colorado agriculture, consumers, and the natural world. I believe there is a promising future for hemp within American agriculture's safe, diverse and abundant production. In order to achieve that future, we need a stable and sound regulatory environment that will foster diverse market opportunities, sustainable

growth, and meaningful investments in natural resource stewardship for the greater good of the industry and future generations.

Thank you for your time today.

[The prepared statement of Ms. Greenberg follows:]

PREPARED STATEMENT OF KATE GREENBERG, COMMISSIONER, COLORADO DEPARTMENT OF AGRICULTURE, BROOMFIELD, CO

In 2014, Colorado became the first state to administer a hemp program. In 2021, after many years of leadership and development in this space, Colorado continued our efforts to advance the hemp industry with the culmination of the Colorado Hemp Advancement and Management Plan (CHAMP). The CHAMP initiative, launched in 2019, was a collaborative, multi-month effort involving more than 200 stakeholders that included the Colorado Department of Agriculture (CDA), the Governor's Office, Department of Public Health and Environment, Department of Revenue, Department of Regulatory Agencies, Office of Economic Development and International Trade (OEDIT), Department of Public Safety, Colorado Commission of Indian Affairs, Department of Higher Education, local governments and industry experts. The *CHAMP Report*[1] (see attachment) was published on March 26, 2021, and contained 21 key deliverables addressing the regulation of hemp across the entire supply chain, including research and development, seed stock, cultivation, testing, transportation, processing, manufacturing, marketing, and banking and insurance.

Additionally, the Colorado Hemp Program regularly engages stakeholders regarding the State Hemp Plan and rulemaking, holding four quarterly *Hemp Advisory Committee*[2] (HAC) Meetings and two annual *Hemp Symposia.*[3] The HAC is a ten member committee composed of stakeholders, which has helped build the regulatory program in Colorado. The Hemp Program distributes quarterly newsletters, email blasts, and website information to hemp registrants and industry, including grant opportunities and industry and regulatory updates. CDA's Markets Division has surveyed the industry and is regularly connecting hemp-related businesses while promoting domestic and international trade. The Markets Division also regularly communicates with the Global Business Development team at OEDIT and the Governor's Office regarding ongoing priorities related to progressing this up-and-coming industry.

The hemp industry plays an important role in advancing Colorado's and CDA's goals of building economic and supply chain resilience, advancing voluntary stewardship, supporting the next generation in agriculture, and furthering animal health and welfare. Hemp has the potential to create new economic opportunities for farmers who are dealing with a changing climate and increasingly arid land. Our young farmers and ranchers are constantly seeking new ways to support their bottom line and the environment at the same time. The hemp industry has the potential to advance CDA's priorities if we listen to our producers and implement sensible regulations.

Following the 2018 Farm Bill, registered hemp acreage in Colorado increased sharply to 87,408 acres in 2019 from 1,800 acres in 2014. Beginning in 2020, hemp acreage dramatically decreased to the current 3,698 registered acres in 2022. The recent decline in acreage is largely due to the 2019 surplus production that has not yet been depleted. Other factors include the economic disruptions caused by COVID–19, additional states producing hemp post-2018 Farm Bill, and the fact that infrastructure for food and fiber production from hemp has largely not been developed.

Seventy percent of the hemp grown in Colorado through 2019 was for cannabinoid extraction, followed by 25% seed and grain, and 5% fiber and other industrial uses. Following 2019, cannabinoid extraction has decreased to 60%, with seed and grain remaining close to 25%, and fiber and other industrial uses (paper, plastics, hemp wood, and hempcrete) have risen to 15%. Surveyed hemp producers have cited the lack of a hemp market outside of cannabinoid production and not having the resources to convert to fiber production as primary barriers to entering new markets.

Since full implementation of the State Plan on January 1, 2022, CDA has had to adapt our program in numerous ways to meet the new requirements in the USDA Final Rule. CDA has expanded from 30% to 100% testing of all hemp lots, and approved 18 performance-based sampling plans, including research and disposal plans. Additionally, CDA ensures hemp producers register acreage with the USDA Farm

[1] *https://drive.google.com/file/d/1m2J4bNRcn9SPg0-2hZtJrcE6-aBlBrKv/view?usp=sharing.*
[2] *https://ag.colorado.gov/plants/hemp/general-information/hemp-advisory-committees.*
[3] *https://ag.colorado.gov/plants/industrial-hemp/general-information/hemp-symposia.*

Service Agency (FSA); completes monthly Federal reporting requirements; and has trained and certified 16 authorized samplers throughout the state to achieve 100% sampling of all lots. As a result, the enforcement and legal responsibilities for CDA have increased in order to provide customer service to support registrants, certified labs, and sampling agents with new requirements.

The 2018 Farm Bill placed many significant burdens on hemp producers, including much higher sampling and testing fees, completing required background checks, and FSA acreage reporting, which is duplicative in nature because it is already reported to the USDA through state reporting. Currently in Colorado, as in many other states, 100% of regulatory program costs are paid by producers through registration fees. Colorado is facing similar challenges as the states that have turned their programs over to the USDA in terms of making our program financially sustainable. This has included the challenges of fixed minimum regulatory costs with highly fluctuating registration numbers.

In July 2022, 74 hemp producers responded to a CDA Survey to assist the CDA Hemp Program in better understanding and supporting Colorado's hemp registrants. Some of the challenges identified by Colorado producers include registration and other fees, over-regulation, and the need to increase the allowable THC limit from 0.3% to 1.0%. Registrants also responded that more regulatory flexibility should be given to crops grown for fiber, seed, food, and feed.

In comments provided on the USDA's Interim Final Rule on January 29, 2020, and October 8, 2020, CDA requested that USDA provide flexibility as well as remove some of the requirements from the Final Rule. USDA staff have been very responsive to our concerns and requests for flexibility when they have the authority to do so. We greatly appreciate their partnership in this work. However, there are certain statutory changes that would provide the USDA greater flexibility and improve state-run hemp programs. Our recommended changes are:

1. **Remove DEA requirements for testing labs.**

   The USDA's Final Rule requirement for hemp testing laboratories to be DEA registered should be removed as it is time-consuming, inefficient, and unnecessary. The requirement is too cumbersome and takes too long to implement. As soon as the IFR was promulgated in October 2019, CDA initiated the process of obtaining DEA certification for its state-of-the-art laboratory. Even though the CDA laboratory had been performing testing and analysis of cannabis samples in support of Colorado's cannabis-related regulatory programs for many years, up until this hearing, CDA still awaits DEA approval. Based on our experience in seeking approval at the state laboratory, we worry it may take years for other laboratories to obtain DEA certification, which will create a testing capacity problem in Colorado.

2. **Allow the use of certified seed as an alternative to the strict testing requirement.**

   Plant varieties are developed by plant breeders and are protected by the Federal and State Plant Variety Protection Act and Regulations. These varieties are known to have Distinct, Uniform, and Stable characters and are multiplied and marketed as certified seeds under the protection of the Federal and State Seed Act. As hemp varieties are developed with acceptable THC levels, the same system that has served other plants should serve to protect and certify the identity of hemp. A grower who uses certified hemp varieties should not be regularly tested for THC since THC compliance is certified with a seed certification system. This will significantly reduce the cost of operations and encourage farmers to adopt stable genetics that produce consistency in the industry, helping several facets of the industry simultaneously—both farmers and those engaged in seed and genetic development.

3. **Remove background check requirement.**

   The 2018 Farm Bill has paved the way for hemp to be grown as an agricultural commodity. Farmers have the opportunity to benefit from its multiple potential uses and enable diversity in their choice of crop. Over the last 7 months of implementing the USDA program, we received consistent pushback from farmers and growers over the background requirement. The requirement added cost, required time until we receive results, and added an extra process of notifications putting strain on already small program resources. Additionally, the background provision prevents those that have completed their rehabilitation from participating in growing a legal agricultural commodity.

4. **Establish a Federal grant program to support the state's hemp program.**

As a result of requirements in the 2018 Farm Bill and the USDA's Final Rule, the hemp industry is highly regulated with intensive data collection, background checks, land registration, sampling, testing, inspection, enforcement, and reporting requirements. A majority of state programs, including CDA's program, are cash funded, meaning we depend on the revenue collected from registration fees to provide the services. Hemp registration is at its lowest level since the program's creation, generating significantly less revenue and making our ability to continue to run the program into the future more tenuous. As of this hearing, several states have closed their program. With the current registration trends, more states are likely to close their programs due to loss of revenue, putting more pressure on USDA to take over the regulation in those states and threatening the sustainability of the program. The USDA should be charged with establishing a program to financially support states that have implemented hemp regulatory programs much the same way the USDA does for other Federal requirements implemented by the states. States like Colorado are implementing Federal requirements and taking this regulatory burden off of the USDA without financial compensation.

5. **Accelerate the regulatory process to allow the use of Hemp as feed.**

Scientific research has shown hemp to have promising nutritional benefits to livestock and pet animals. Studies are still ongoing to demonstrate the safety and efficacy of hemp as a feed ingredient. Colorado stakeholders have worked for years to demonstrate safety and effectiveness through collaborative research and numerous discussions on how to develop a national path forward to safe and legal approval. Providing Federal support for research is necessary to ensure that the industry can demonstrate the safety and effectiveness of hemp as quickly as possible through the FDA's rigorous review process. FDA approval of hemp as feed will immediately open significant new market opportunities for hemp producers as well as provide a new, sustainable source of animal feed to large feed and pet food manufacturers.

Colorado is a leader in the hemp industry because our agricultural producers are entrepreneurial, and those dedicated to supporting the industry are driven to see it succeed. Stakeholders from across the industry and state government came together to develop the key deliverables in the CHAMP Report with the goal of promoting the health and safety of the hemp industry for farmers, processors, and consumers. The State of Colorado is doing everything we can to support our hemp producers and invest in a vibrant, resilient future for Colorado agriculture; however, Colorado's vision for our hemp industry cannot be realized without changes in Federal statutes and regulations.

ATTACHMENT

Colorado Hemp Advancement & Management Plan C.H.A.M.P.

March 26, 2021

Colorado Governor Jared Polis, Department of Agriculture, Department of Public Health & Environment, Department of Regulatory Agencies, Office of Economic Development & International Trade

Prepared by: CHAMP Stakeholders, Colorado State University, MPG Consulting, Roenbaugh Schwalb

Facilitated by: Government Performance Solutions

Table of Contents

Hemp Cultivation in Colorado
Future Opportunities

Executive Summary

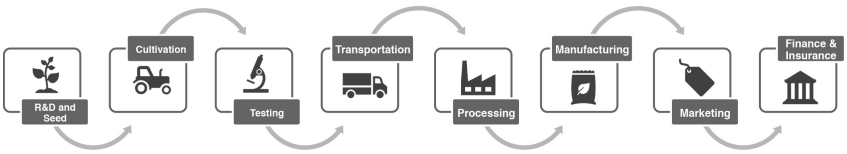
In response to Congress passing the Agriculture Improvement Act of 2018 (the 2018 Farm Bill), the anticipated publication by USDA of enabling regulations for the cultivation of industrial hemp, and Governor Jared Polis's stated priority for Colorado to remain a driving force in hemp production, the Colorado Department of Agriculture formed a statewide partnership known as the Colorado Hemp Advancement and Management Plan (CHAMP) in June 2019.

The CHAMP initiative represents a broad stakeholder effort that includes representatives from the Colorado Department of Agriculture (CDA), the Governor's Office, Colorado Department of Public Health and Environment (CDPHE), Department of Revenue (DOR), Department of Regulatory Agencies (DORA), Office of Economic Development and International Trade (OEDIT), Department of Public Safety (DPS), the Department of Education (CDE), the Ute Mountain Ute Tribe, the Southern Ute Indian Tribe, local governments, state institutions of higher learning, and industry experts. A list of all CHAMP stakeholders and participants is included in *Appendix A*.

Through the CHAMP process, stakeholders crafted economic advancement principles for the entire hemp supply chain, including research and development, seed, cultivation, testing, transportation, processing, manufacturing, marketing, and finance and insurance. The CHAMP initiative ensured that a wide range of stakeholders, including members of the public, had the opportunity to comment on and participate in shaping a variety of hemp-related policies the State of Colorado should strive to implement.

The goals of this collaborative process were to develop a robust and functional hemp supply chain; to create new, sustainable, and inclusive employment and entrepreneurial opportunities; and to expand markets for Colorado agricultural communities. At the time of this report many questions and concerns remain on what the final Federal regulations will look like. Moreover, the impact of COVID–19 is currently a key factor in the development of the hemp industry as well as the state's ability to implement the stakeholder recommendations. As such, this report represents a snapshot in time, defining the general direction stakeholders felt Colorado should pursue in the future. Colorado will nevertheless continue to adjust to meet the challenges in this new industry.

Figure 1. Hemp Supply Chain



Objective Statement

The CHAMP initiative aims to promote the health and safety of the hemp industry for farmers, processors, and consumers. In doing so, Colorado hopes to set a national example for how to establish an advanced hemp industry. The state will achieve this objective through balanced regulatory policies with a focus on economic and workforce development, inclusion, education, R&D, finance, and entrepreneurship. This report is created from the CHAMP stakeholder process, which reflects a general consensus reached among stakeholders in the industry, state and local government, federally recognized Indian Tribes, and higher education institutions on the steps needed to advance the hemp industry. Each recommendation was debated in an open forum, providing an opportunity for all participants to voice support or dissent and discuss as a group. In this way, the report provides a blueprint for actions needed to create and sustain a thriving hemp industry in Colorado.

Governance and Process

The CHAMP initiative is a collaborative endeavor that spans multiple agencies, federally recognized Indian Tribes, local governments, and industry representatives. A board of directors provided high-level guidance for the initiative. Several other governing groups, including an executive committee, provided targeted guidance and reviewed draft materials.

Eight stakeholder groups, each representing a distinct link in the hemp industry supply chain, met to discuss in greater detail the challenges and opportunities fac-

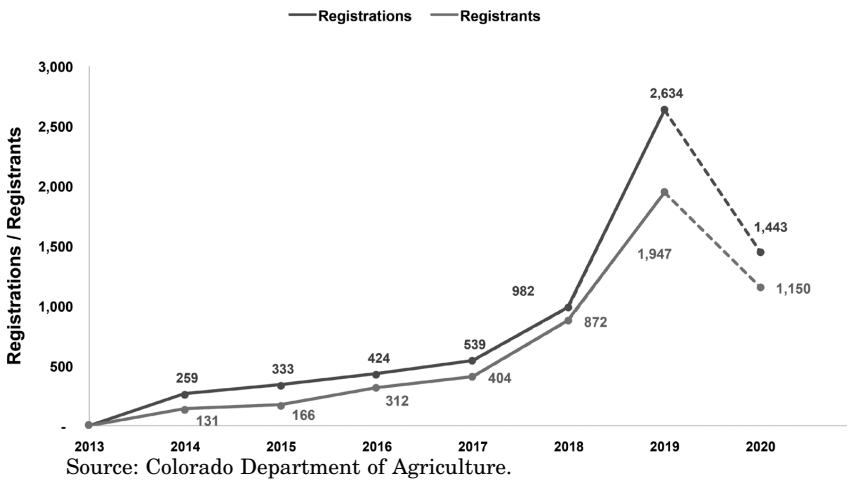
ing the industry. In total, 202 stakeholders participated in the effort, meeting three times from July through December 2019. Stakeholder groups included 25–30 representatives from each area of the hemp supply chain, together with representatives from the legal, financial services, and insurance industries. The eight stakeholder groups developed the policy recommendations included in Section 2 of this report.

Industry Analysis

Hemp is an emerging specialty crop that has received considerable attention from agricultural producers, consumers, manufacturing businesses, and policymakers both internationally and in the State of Colorado. Hemp cultivation may provide an alternative enterprise to improve grower profitability and a potential engine of economic development and business creation, all while contributing to the sustainability of Colorado's natural resources as a substitute crop. Hemp can be manufactured and processed into numerous industrial and commercial goods for which there is national and international demand. Hemp applications range from building materials and textiles to food ingredients and wellness products.

About 13 percent of all hemp acres registered and planted in 2019 in the United States were in Colorado, the most of any U.S. state. Hemp acreage increased substantially over the past 3 years in Colorado and the U.S. in response to reformations to its legal status, creating an increase in biomass supplies at the producer level. However, hemp acreage decreased substantially in 2020 in Colorado and across the country. CDA records provide information on the number of registrations and the registered land area between 2014 and late July 2020. Between 2014 and 2019, the number of registrants and registrations grew each year, resulting in about a tenfold increase during that period. As of late July 2020, however, the number of registrants and registrations dropped between 40 and 45 percent below their comparable 2019 totals, respectively.

Figure 2. Colorado Hemp Registrants and Registrations, 2014–July 2020



Source: Colorado Department of Agriculture.

Many growers enjoyed solid returns in the 2014–2018 period of pilot programs organized under the Agricultural Act of 2014 (2014 Farm Bill). A relative scarcity of raw material and domestically produced flower available to supply the rapidly expanding cannabidiol (CBD) market helped to maintain wholesale prices for hemp and hemp products well above break-even levels. Starting in 2019, however, there was a sharp increase in production accompanied by a price collapse in the commodity market driven by both supply and demand. On the supply side, expansion of hemp production to new states and a dramatic expansion of planted acreage over a short period of time made hemp biomass relatively more abundant than it had been before. A lack of extraction and processing capacity, coupled with slower-than-expected consumer demand for CBD and other hemp products, yielded an environment in which hemp supply exceeded 2019 processing capacity or demand.

Colorado is poised to benefit, however, as the supply chain grows and matures. For this growth in demand to occur, the industry must be proactive about early-stage issues like standardization, unproven use cases and efficacy, and the accuracy of dosing for consumable products. Moreover, it is imperative that Colorado explores

all potential opportunities and supports a supply chain that relies upon industrial hemp for use in textiles, polymers, and construction inputs.

Colorado can continue to lead in hemp innovation by facilitating and maintaining a favorable regulatory environment for research and development. The recommendations outlined in this CHAMP document demonstrate that the Colorado hemp industry continues to position itself as a production and manufacturing leader.

To achieve leading status, research and development will be needed in several areas including (1) plant genetics; (2) effective uses for a variety of hemp industrial applications; (3) consumer uses and preferences for cannabinoid products; and (4) scalable and safe manufacturing practices.

Key Stakeholders

The following are key agencies and institutions involved in advancing and regulating hemp in Colorado.

Figure 3. Agency and Institution Summary

Agency or Organization	Role in Hemp Advancement and Regulation
Governor's Office	Support, coalition building and resource investment
	Vision—providing a roadmap to an agricultural and industrial economic engine
	Experience—Governor Polis offered key hemp research provision in the 2014 Farm Bill, while serving in U.S. House of Representatives.
Department of Agriculture	Registration—Cultivation registration and management of electronic registration system.
	Field Sampling/Testing—Conduct and certify field sampling and THC testing.
	Certification Support—Provide THC testing in support of the seed certification program.
	Market Development—Provide general support to expand the growth of the hemp through the Markets Division.
Department of Public Health and Environment	Lab Certification and testing for third-party THC testing labs.
	Processor and manufacturer licensing, inspection and process validation.
	Marketing and labeling standards, including identity statement, ingredient list, batch tracking and other information.
Office of Economic Development and International Trade	Promote hemp as a high-value agricultural commodity and a next-generation industry.
	Employ economic development tools and incentives where appropriate.
Office of the Attorney General	Develop hemp policy in concert with state agencies.
	Address legal issues surrounding hemp with Federal Government.
Department of Public Safety	Enforce state hemp laws.
	Facilitate and support CDA implementing background checks.
	Work with local municipal, Tribal, and county law enforcement agencies to meet public safety needs.
	Coordinate with other law enforcement agencies to address inter- and intrastate transportation issues.
Higher Education Institutions	Colorado State University, University of Colorado, Adams State University, Fort Lewis College, CSU-Pueblo Institute of Cannabis Research, and Colorado Mesa University.
	Education outreach initiative for farmers, consumers, and the public through CSU.
	Cooperative extension service provides expertise on agriculture, water, business management.
	The Hemp Center of Excellence will centralize and advance hemp research, education, and grants.
Department of Regulatory Agencies	Liaison to the insurance industry to ensure proper coverages are available to hemp businesses.
	Financial services education for proper debt and other financing is available to the hemp industry.
	Assist financial institutions to extend services to the hemp industry.
Department of Natural Resources	Monitor hemp cultivation and processing operations to confirm legal water source and ensure proper water treatment prior to release.
Department of Revenue	Certain hemp products are sold at regulated marijuana retail stores.
	Certain hemp products can be used as an ingredient for regulated marijuana products.
Ute Mountain and Southern Ute Tribes	Tribes are actively monitoring the hemp market and may develop a management plan, and production and/or processing enterprises.
Local Government	Local governments may issue local occupancy permits that will be a condition of state permits where applicable.
	Zoning and land use ordinances for locating indoor growing, processing, and manufacturing facilities.
	Code enforcement, for fire safety, odor control, building safety, and other requirements.

Figure 3. Agency and Institution Summary—Continued

Agency or Organization	Role in Hemp Advancement and Regulation
Colorado Industry and Nonprofit Organizations	COHIA propels the hemp industry forward in Colorado through information, public policy work, and market development. Hemp Feed Coalition's objective is the Federal recognition of hemp as an animal feed ingredient. CSGA is the official seed certification agency and certifies hemp seed. Rocky Mountain Farmers Union is an advocate for family farmers and ranchers, rural communities, and consumers. Colorado Farm Bureau provides advocacy and various services to the agriculture community in Colorado. Colorado Bankers Association assist Colorado bankers understand the hemp industry and regulatory obstacles.

Market-Level Principles and Policy Recommendations

There were several recurring principles that emerged from the multiple stakeholder groups, documented below. These principles will are noted throughout the recommendations, and a holistic approach to each is essential in ensuring a successful hemp regulatory program.

Principle 1: Promote economic development across the supply chain

Principle 2: Chain of custody and information sharing will drive an expanding hemp industry

Principle 3: Focus on THC Control

Principle 4: Recognize the importance of Federal compatibility while also advocating for reasonable regulations

Principle 5: Recognize the importance in intergovernmental coordination

Principle 6: Promote access to finance and insurance services across the supply chain

Principle 7: Promote equity, diversity and inclusion across the supply chain

Identification of key recommended deliverables through the stakeholder process was the driving focus of the CHAMP initiative. The following stakeholder recommendations represent sensible and forward-looking deliverables intended to bolster Colorado's hemp industry. However, it is important to note that implementation is conditional on the market need, Federal regulatory environment, procurement of resources, including increased staff and funding, as well the passage of legislation and production of rules and regulations. Dynamic changes are still occurring for the hemp industry, particularly regarding market conditions and Federal regulations. Moreover, the [COVID]–19 pandemic will most likely have an adverse impact on funding, staffing, and other resources.

While these recommendations represent a general consensus of the stakeholders, including the agencies that will implement the deliverables, some of these recommendations may be difficult to implement, require adjustments, or may be delayed based on the factors mentioned above.

Figure 4. Recommendation Summary

No.	Supply Chain Area	Title	Existing/New Program	Agencies	Summary
1.	R&D and Seed	Hemp Seed & Clone Certification Program	Existing program with enhancement/expansion	CDA, CSU, CSGA, AOSCA	Support research and development to provide stable hemp genetics and increased availability of varieties that will consistently meet THC compliance regulations. Continue to allow the use of open source seeds in Colorado.
2.	R&D and Seed	Cross-pollination Information	New program	CDA, Center of Excellence, Colorado universities	Allow CDA to provide limited information on the presence of hemp farms to other nearby hemp producers to help minimize cross-pollination. Research ways to mitigate cross-pollination issues (Center of Excellence and educational institutions).
3.	R&D and Seed	Plant Breeding and Genetic Research Regulations	New program	CDA, Colorado universities, Center of Excellence, CSGA	Establish a separate registration program specific to hemp plant breeding and genetic research to improve the quality and uniformity of seed genetics and supply for the state's producers.

Figure 4. Recommendation Summary—Continued

No.	Supply Chain Area	Title	Existing/New Program	Agencies	Summary
4.	Cultivation	USDA State Plan Alignment	New program	CDA, CDPHE	Align state hemp regulatory practice with USDA requirements to ensure uninterrupted operations. Advocate for appropriate changes to Federal law as needed to promote growth and investment in the Colorado hemp industry.
5.	Cultivation	Legal Water Supply	New program	DNR, CDA	Update CDA registration process to develop a procedure and guidelines to collaborate with DNR. DNR will ensure registrants have legal access to water for cultivation.
6.	Cultivation	Center of Excellence	New program	CDA, CDPHE, Colorado universities, OEDIT, Tribal governments	Develop a public-private partnership between academic institutions, industry, state agencies, and private stakeholders to establish a Colorado Hemp Center of Excellence to accelerate development and research and education in hemp cultivation, science, and technology.
7.	Cultivation	Non-Compliant Plant Material	Existing program with enhancement/expansion	CDA, CDPHE, Tribal governments	Follow USDA rules for sampling, testing, and non-compliant plant material disposal. Advocate for ways to test and dispose of non-compliant plant material that retain value in the supply chain, including post-harvest testing, industrial uses, and remediation procedures. Ensure disposal regulations are operable and not overly burdensome for the state or hemp producers.
8.	Cultivation	Coordination of State and Local Regulatory Authority	Existing program with enhancement/expansion	CDA, CDPHE, Tribal and local governments, law enforcement agencies	Provide hemp registration information to other state and local government agencies, under a privacy restriction, to facilitate other jurisdictions' inspections, permit approvals and enforcement actions as directed by Federal law.
9.	Testing	Field Sampling and Sampling Agent Certification	Existing program with enhancement/expansion	CDA	Review and improve guidance on sampling and testing hemp grown in Colorado for THC content according to USDA requirements and establish a certification program to allow third parties to collect samples in the field for regulatory use.
10.	Testing	Hemp Lab Certification Program	Existing program with enhancement/expansion	CDPHE, CDA	Develop a certification program that provides guidance to private analytical laboratories on certification requirements, appropriate analytical methods, and general testing procedures.
11.	Transportation	Electronic Traceability System	New program	CDA, CDPHE, Tribal and local governments, law enforcement	Implement an ETS to support an uninterrupted chain of custody for hemp products from harvest to commercial sale and to provide secure and verifiable information to various stakeholders.
12.	Transportation	Transportation Protocol	Existing program with enhancement/expansion	CDA, CDPHE, Tribal and local governments, law enforcement	Develop guidance and best practices for transporting hemp and hemp products within Colorado, including proper documentation and recordkeeping.
13.	Processing	Processor Registration and Inspection	Existing program	CDPHE, CDA	Continue the integration of hemp into the current Food and Supplement Manufacturer Program. Further define licensed activities as needed and provide a means for the state to register and regulate hemp processors and manufacturers in Colorado. This is an existing, active program.
14.	Processing/Manufacturing	Processor and Manufacturer Standards	Existing program	CDPHE, CDA	Clarify and develop state regulatory requirements and appropriate policy and guidance for processing and manufacturing practices related to hemp products for human consumption.

Figure 4. Recommendation Summary—Continued

No.	Supply Chain Area	Title	Existing/New Program	Agencies	Summary
15.	Manufacturing	Manufacturer Registration and Inspection	Existing program	CDPHE, CDA	Continue the integration of hemp into the current food and dietary supplement manufacturer program. Further define licensed activities as needed and provide a means for the state to register and regulate hemp processors and manufacturers in Colorado. This is an existing, active program.
16.	Marketing	Glossary of Terms	New program	CDPHE, CDA	Provide a list of terms and definitions for different stages in the supply chain to create a universal understanding of the terminology used for hemp production, marketing, and other purposes.
17.	Marketing	Marketing and Labeling Guidance	Existing program	CDPHE, CDA	Establish guidance for retailer and manufacturer marketing and labeling which harmonize with national and international standards, when appropriate, for consumable hemp products.
18.	Marketing	Quality Assurance Certification Program	New program	CDA, CDPHE	Form a quality assurance program such as a "Good Hemp Program" that defines that establishes the minimum standards which Colorado producers/manufacturers must meet to qualify for special certification/designation, the fees from which will fund hemp research and promotion.
19.	Marketing	State Procurement of Industrial Hemp Products	New program	Statewide	Encourage state procurement of industrial hemp products.
20.	Finance & Insurance	Guidance & Best Practices	Existing program	DORA	Provide guidance and best practices to financial services institutions and insurance carriers to facilitate increased access to financial services for Colorado hemp businesses.
21.	All	Expanded Data Availability	New program	DORA, CDA, CDPHE, OEDIT	Provide aggregated registration and other information to financial institutions and insurance carriers to help expedite access to services.

Future Research and Policy Development

The following regulatory issues were identified during the stakeholder meetings and subsequent proceedings as issues or subjects that required further research and policy development.

- **Feminized seed and clone certification.** Convene a stakeholder process to develop guidance and determine the feasibility of a feminized seed certification program and for the operational model and facilities for a clonal certification program. This program will involve CSGA and CDA.
- **Cross-pollination.** Research distance, pollen viability, size, and other factors that determine risk for hemp cross-pollination.
- **Retaining value in the supply chain.** Use existing regulatory avenues for non-compliant plant material including advocating for exemption of mature stalks and seeds from destruction. In addition, convene a stakeholder process to determine the rules and procedures to develop secure supply channels that allow non-compliant plant material to be processed for non-consumable industrial uses; or to have the THC extracted and removed from the stream of commerce.
- **Co-location of hemp and licensed marijuana businesses.** Prohibit the co-location of marijuana and hemp cultivation, processing, and manufacturing businesses until Federal laws allow. Explore an efficient regulatory structure to allow for the co-location of all types of cannabis cultivation and/or manufacturing facilities.
- **Electronic traceability system.** Convene a process to develop specifications, security, and documentation requirements for an ETS that will ensure a secure chain of custody for hemp products in Colorado.
- **Transport of concentrated intermediate products.** As Federal law allows, determine a transportation protocol for intermediate hemp concentrates. These are business-to-business transactions where products transported will be further processed to bring THC levels into compliance before sale to consumers.
- **Non-consumable industrial hemp manufacturing.** Determine whether additional regulatory oversight of industrial products manufacturing operations is needed, and if so, establish the lead regulatory agency and most advantageous regulatory framework.

- **Inhalable and suppository hemp.** Determine the best regulatory treatment for inhalable and suppository hemp, whether direct initial regulation by the state or by deferring to the Federal Government timeline for hemp product regulation.
- **Quality assurance program.** Determine the costs and benefits of developing a quality assurance program that sets quality, purity, and process standards and promotes a Colorado brand of hemp products.
- **Retail Framework.** Convene a stakeholder process to develop a retail framework for hemp that integrates into an existing retail framework for food or dietary supplements.
- **Financial services and insurance data.** Determine data gaps that exist for insurance and financial institutions and the specific requirements and funding needed to expedite access to services

The items listed above may require a task force or stakeholder process to further develop the proper regulatory scope and implementation action items[.]

Section 1. Industry Analysis and Key Stakeholders

Introduction

In response to passing the 2018 Farm Bill, the anticipated publication of additional enabling regulations, and Governor Jared Polis' stated priority for Colorado

to remain a driving force in hemp production, the Colorado Department of Agriculture (CDA) developed a statewide partnership known as the Colorado Hemp Advancement and Management Plan (CHAMP) in June 2019.

Even though Colorado has hosted a successful hemp industry since 2014, it was clear that Colorado would need to quickly establish a regulatory framework to accommodate new producers and products entering the market and to narrow regulatory gaps in the hemp supply chain not considered by the 2018 Farm Bill. In addition, with new market opportunities materializing, Colorado needed to implement initiatives to advance the growth of the industry. CHAMP was formed to develop a blueprint that would outline how the state could address the top issues related to both the advancement and management of the state hemp industry. Through the plan's development, Colorado aimed to build consensus among the different stakeholder groups that represent the industry, regulators and governmental agencies, and academic institutions.

The CHAMP initiative and this report both represent a broad stakeholder effort intended to achieve that consensus. The CHAMP initiative includes representatives from CDA, the Governor's Office, Department of Public Health and Environment (CDPHE), Department of Revenue (DOR), Department of Regulatory Agencies (DORA), Office of Economic Development and International Trade (OEDIT), Department of Public Safety (DPS), the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, Department of Education (CDE), local governments, state institutions of higher learning, and industry experts. A list of all CHAMP stakeholders is included in *Appendix A.*

Through the CHAMP initiative, stakeholders explored challenges and opportunities facing the Colorado hemp supply chain, including research and development, seed, cultivation, testing, transportation, processing, manufacturing, marketing, and finance and insurance. CDA created the CHAMP initiative to ensure that a wide range of stakeholders, including members of the public, would have multiple opportunities to comment on and participate in a variety of industrial hemp topics.

The goals of this collaborative policy planning process are to (1) develop a robust and functional hemp supply chain; (2) create new sustainable employment and entrepreneurial opportunities; and (3) establish a strong market for Colorado agricultural communities.

Ultimately, the resulting framework presented in this report outlines challenges faced by the hemp industry and initiatives suggested by stakeholders to maintain and build upon Colorado's position as an industry leader, representing the largest gathering of the hemp industry and government stakeholders held in any state to date.

Regulatory Context

The 21 recommend deliverables outlined in this report represent a consensus regarding hemp-related policy priorities for Colorado. Implementation is conditioned on the regulatory environment; resources, including increased staff and funding; as well as the passage of legislation and corresponding regulatory action. While every effort will be made to pursue these policies and programs, the Federal Government may continue its strict regulatory posture and insufficient resources may impede overall implementation; particularly with the economic impact of COVID–19. But the market-level principles and stakeholder recommendations in this report collectively represent a broad guidance document for statewide policy for the hemp supply chain. CHAMP is informed by the following laws, regulations, and policies.

State Law

Colorado citizens voted to pass Amendment 64 to the Colorado Constitution in 2012, which in part directed the General Assembly to enact legislation governing the cultivation, processing, and sale of industrial hemp.[1] Legislation adopted in 2013 delegated responsibility for most hemp-related registration and inspection oversight to CDA. Statutory authority for Colorado's Industrial Hemp Program appears in Title 35 Article 61 of the Colorado Revised Statutes. In the following years, CDA promulgated a comprehensive set of rules to administer and enforce the Colorado Industrial Hemp Regulatory Program Act, which is enabled by the regulations in 8 CCR 1203–23. Under Colorado's program, interested producers and product

[1] As defined in the Colorado Revised Statutes, and in the 2018 Farm Bill, the term "industrial hemp" means the plant species *Cannabis sativa* L. and any part of that plant, including the seeds thereof and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a Δ-9-tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis.

manufacturers must register with CDA or CDPHE to produce or manufacture hemp or hemp products.

2018 Federal Farm Bill

The 2018 Farm Bill clarified that both hemp and hemp products are legal in the U.S., amended the Controlled Substances Act (CSA) to remove hemp from the definition of marijuana, and revised language in the 2014 Farm Bill to expressly include products derived from hemp in the legal definition of industrial hemp. The legislation also allowed commercial cultivation and manufacture of hemp outside of 2014 Farm Bill pilot projects. Under the 2018 Farm Bill, each state must submit a plan to the USDA for approval that includes a framework for regulation and monitoring of production. The 2018 Farm Bill also instructs the USDA to promulgate Federal rules for commercial hemp production. Importantly, the 2018 Farm Bill does not address regulations for processing and manufacturing of hemp products into food, drugs, and cosmetics, which are still forthcoming from the Food and Drug Administration (FDA) as of the date of this report.

USDA Interim and Final Rule

The USDA issued its first set of hemp regulations in October of 2019, the Interim Final Rule (IFR), which formally addressed hemp cultivation, harvest, and testing. The IFR established a regulatory framework for USDA oversight of domestic hemp production under the 2018 Farm Bill. The IFR established requirements for approval of state or Tribal plans regulating the production of hemp in their territories. Rules addressed the production, sampling, testing, and disposal of hemp plants, and set thresholds for acceptable amounts of THC. In comments submitted to USDA, the State of Colorado twice urged USDA to modify the IFR and adopt a more flexible regulatory structure to advance the development of a robust, nationwide hemp industry.[2] In January of 2021, the USDA published a Final Rule which made several changes from the IFR. Many of the changes aligned with the comments submitted by the State of Colorado. Specifically, the USDA cited the comments from Colorado as one of the reasons for increasing the time to sample from 15 to 30 days before harvest, and to allow remediation of non-compliant plants into complaint plant biomass to help farmers mitigate against financial loss.

State Hemp Plan Submitted to USDA

The 2018 Farm Bill and the IFR require each state that desires to have primary regulatory authority over the production of hemp within its jurisdiction to submit a management plan to USDA that outlines the regulation of various aspects of hemp cultivation. The State of Colorado submitted its plan for USDA review on June 16, 2020. Many details of this plan were derived or adapted from stakeholder involvement in the CHAMP process and from the existing Colorado industrial hemp regulatory framework, which was established after the adoption of Senate Bill 13–241 in 2013. The state plan submitted to USDA pushed for several policies reflected in CHAMP that are designed to protect and advance the industry. Some of these policies were revised to address the specific requirements laid out by USDA in the IFR. Due to the changes made by the USDA from the Interim to Final Rule, Colorado will be submitting a revised plan by October 2021. CDA will continue to advocate for policies that best work for Colorado and its hemp producers while staying within Federal guidelines as adopted in Senate Bill 20–197, which aligns state and Federal hemp policy and regulation.

DEA Interim Final Rule

In response to the 2018 Farm Bill and the USDA IFR, the U.S. Drug Enforcement Administration (DEA) adjusted some of its rules regarding hemp and marijuana in August 2020. These changes are stated by the DEA to "merely conform" certain definitions to the 2018 Farm Bill, although there has been immediate opposition and lawsuits filed from hemp industry groups. On the surface, the IFR completes three revisions: (1) Revising the definition of "tetrahydrocannabinols" to exclude naturally occurring tetrahydrocannabinols in hemp; (2) Revising the definition of marijuana extract (a controlled substance) to include any cannabis (*i.e.,* marijuana or hemp) extracts with a concentration of more than 0.3 percent Δ9-THC on a dry weight basis; and (3) Removing FDA approved drugs that contain CBD from the controlled substances list. The rules, if implemented as written, would limit certain hemp-derived cannabinoid production and require all hemp extracts to be kept below 0.3 per-

[2] See comments submitted to USDA on the IFR, *https://www.colorado.gov/pacific/sites/default/files/FinalIFRComments2020_0.pdf; https://drive.google.com/file/d/1kUpA86y7oJ3tNEsVQR26oIDoRdoLHrAu/view*.

cent THC for transport. These rules add further regulatory complexity and risk to hemp production and processing.

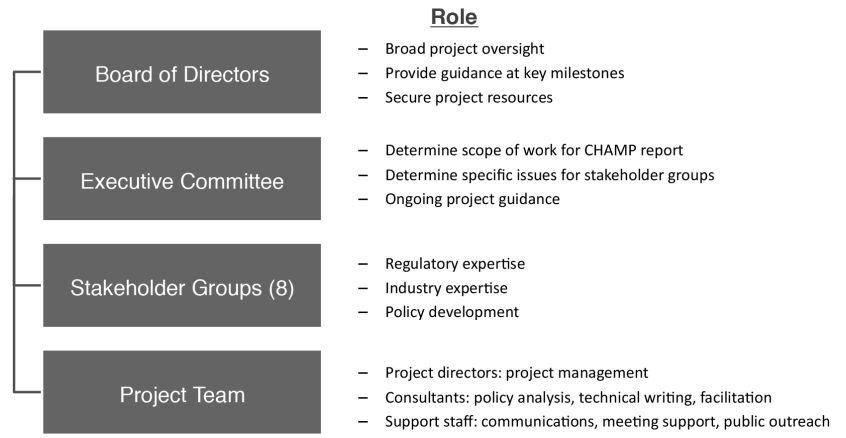
Objective Statement

The CHAMP initiative aims to promote the health and safety of the hemp industry for farmers, processors, and consumers. In doing so, Colorado hopes to set a national example for how to establish an advanced hemp industry. The state will achieve this objective through balanced regulatory policies with a focus on economic and workforce development, inclusion, education, R&D, finance, and entrepreneurship. The strength of this report is that it reflects a consensus view among stakeholders on how to advance the hemp industry in Colorado. The consensus was achieved through inclusive dialogue involving stakeholders in the industry, state and local government, federally recognized Indian Tribes, and higher education institutions. In addition, the report functions as a blueprint for building and sustaining a thriving hemp industry in Colorado by providing a comprehensive set of recommendations for developing and implementing policies in support of each link in the hemp supply chain.

Governance and Process

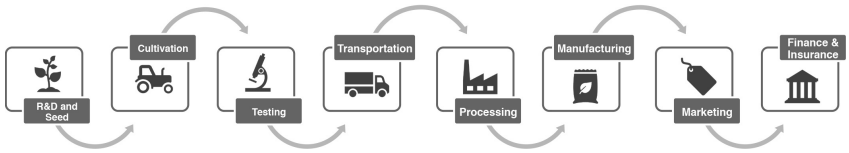
The CHAMP Board of Directors provides high-level guidance for the initiative. The CHAMP executive committee provides more targeted guidance and review of draft materials. The governing structure of the project is depicted in *Figure 5*.

Figure 5. CHAMP Governance



The executive committee met in July 2019 to develop the scope of work and discussion topics for each stakeholder group. There were eight stakeholder groups that met from July through December 2019. The stakeholder groups developed the CHAMP policy recommendations included in Section 2 of this report. The eight stakeholder groups each consisted of 25–30 specific state, Tribal, and local officials, and industry experts in each area of the hemp supply chain. Stakeholder groups also included representatives from the legal, finance, and insurance industries. There were 202 total stakeholders across eight stakeholder groups. *Figure 6* shows a description of the supply chain and stakeholder groups.

Figure 6. Hemp Supply Chain



Each stakeholder group met three times and developed a number of individual recommended deliverables.

The project team compiled and combined stakeholder group work into 21 key recommendations spanning eight distinct links in the hemp industry supply chain.

Additional engagement completed as part of the CHAMP initiative includes several public meetings held across the state to solicit public input; a stakeholder meeting to discuss and solicit comment on the USDA IFR document; and submission of the state hemp plan to USDA. Throughout the process, members of the project team provided support and research on regulatory best practices, economic and market opportunity and characteristics, and a synthesis of proceedings into the recommendations contained in this report.

Industry Analysis

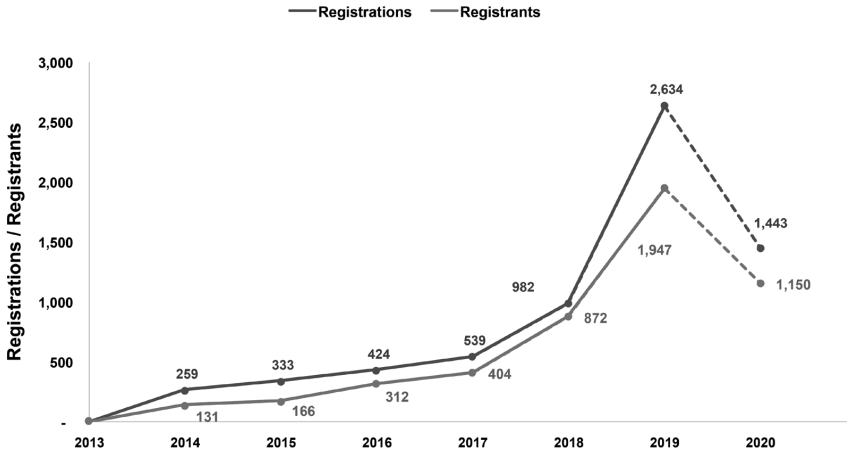
The following is a brief summary analysis of Colorado's hemp industry; a more detailed analytical review can be found in *Appendix B*.

Hemp is an emerging specialty crop that has received considerable attention from agricultural producers, consumers, manufacturing businesses, and policymakers both internationally and in the State of Colorado. Hemp cultivation may provide an alternative enterprise to improve grower profitability and a potential engine of economic development and business creation while also contributing to the sustainability of Colorado's natural resources as a substitute crop. Hemp can be manufactured and processed into numerous industrial and commercial goods for which there is national and international demand. Hemp applications range from building materials and textiles to food ingredients and wellness products.

While hemp may hold great promise for Colorado, the convergence of the hemp supply chain with the broader agricultural and economic landscape creates uncertainty and challenges. Historically, hemp has been a more regulated crop than others due to its cousin, marijuana. Other challenges include a lack of Federal regulation of post-farm hemp products by the FDA and a general lack of awareness regarding the uses of hemp derivatives in consumer and industrial applications.

Nonetheless, Colorado has been a leader in virtually all measures of hemp activity. In 2019, about 13 percent of all hemp acres registered and planted in the United States were in Colorado, the most of any state in the U.S. Over the past 3 years, hemp acreage has increased substantially in Colorado and the U.S. in response to reformations to its legal status, creating an increase in biomass supplies at the producer level. However, hemp acreage decreased substantially in 2020 in Colorado. CDA records provide information on the number of registrations and registered land area between 2014 and late July 2020. Between 2014 and 2019, the number of registrants and registrations grew each year, resulting in about a ten-fold increase during that period. As of late July 2020, however, the number of registrants and registrations dropped between 40 and 45 percent below their comparable 2019 totals, respectively.

Figure 7. Colorado Hemp Registrants and Registrations, 2014–July 2020



Source: Colorado Department of Agriculture.

Many growers enjoyed solid returns in the 2014–2018 period of pilot programs organized under the Agricultural Act of 2014 (2014 Farm Bill). A relative scarcity of raw material and domestically produced flower available to supply the rapidly expanding CBD market helped to maintain wholesale prices for hemp and hemp products well above break-even levels. Starting in 2019, however, there was a sharp in-

crease in production accompanied by a price collapse in the commodity market driven by both supply and demand. On the supply side, expansion of hemp production to new states and a dramatic expansion of planted acreage over a short period of time made hemp biomass relatively more abundant than it had been before. A lack of extraction and processing capacity, coupled with slower-than-expected consumer demand for CBD and other hemp products, yielded an environment in which hemp supply exceeded 2019 processing capacity or demand.

With producers facing oversupply due to a fragmented market, the long-term outlook suggests that consumers will continue to look for new food and dietary supplement alternatives, while businesses will continue to seek more sustainable and renewable sources of materials. So, despite recent challenges, there is undeniable potential for growth in demand for industrial and consumer hemp products in the U.S.

As the supply chain grows and matures, Colorado is poised to benefit. For this growth in demand to occur, however, the industry must be proactive about early-stage issues like standardization, unproven use cases and efficacy, and the accuracy of dosing for consumable products. Moreover, it is imperative that Colorado explores all potential opportunities and supports a supply chain that relies upon industrial hemp for use in textiles, polymers, and construction inputs.

Overall, there is a lack of consumer education around cannabinoids, which is exacerbated by the lack of Federal regulations related to cannabinoids in consumer products. On the industrial side, there is currently little applied research or proven cost-effective use cases for different hemp applications.

Colorado can continue to lead the industry in hemp innovation by facilitating and maintaining a favorable regulatory environment for research and development. The recommendations outlined in this CHAMP document demonstrate that the Colorado hemp industry continues to position itself as a production and manufacturing leader.

To achieve leading status, research and development will be needed in several areas including (1) genetics; (2) effective uses for a variety of hemp industrial applications; (3) consumer uses and preferences for cannabinoid products; and (4) scalable and safe manufacturing practices.

Key Stakeholders

Many agencies and organizations have played key roles in the overall establishment of the hemp industry in Colorado. The CHAMP initiative brought together these agencies and industry organizations to develop the blueprint for further advancement and management of hemp. What follows below describes a cross-section of the constituencies and highlights the key functions and services provided toward developing Colorado's hemp industry.

Governor's Office

Colorado became a leader in national hemp production with the passage of the 2014 Farm Bill and the subsequent roll-out of Colorado's hemp pilot program. With the changes in the 2018 Farm Bill, the Governor's Office prioritized Colorado's status as an innovative force in promoting the production of hemp as a high-value agricultural product.

The Governor's Office dedicated significant resources to the CHAMP initiative, ensuring early on that the project involved principals from key state departments. Governor Polis twice filed a joint response to the USDA's *Interim Final Rule and Request for Comments,* the first printed on Colorado-grown hemp paper and filed in partnership with the Department of Agriculture and Attorney General Weiser. More recently, the Governor issued a proclamation on June 11, 2020, also printed on Colorado-grown hemp, declaring June 6–June 13 as Hemp Week and ordered an American flag made from industrial hemp flown over the Colorado State Capitol. And on June 18, 2020, with support from the Governor's Office, the CDA filed its hemp management plan with the USDA.

Vision

Since 2014, Colorado's hemp program has grown to include over 87,000 acres of hemp and 2,600 registrations. Moving forward, the Governor's Office hopes to help the Colorado hemp industry grow and innovate while increasing good jobs and keeping Colorado as a top state for production through appropriate regulation.

What's more, the Governor's Office has sought to ensure that hemp producers and hemp-related business obtain access to banking, financial services, finance, and insurance in a manner similar to other parts of the agriculture value chain, initially throughthe joint publication of the *Roadmap to Cannabis Banking & Financial Services* with DORA.

Experience

In five terms as a Member of the U.S. Congress, Governor Polis advanced various bipartisan bills promoting the development of hemp in Colorado. He, along with other Congressional Members, added the hemp research amendment to the 2014 Farm Bill that allowed state agriculture departments, colleges, and universities to grow hemp for academic and agricultural research purposes.[3] In 2017, then-Congressman Polis also helped to launch the Cannabis Caucus, intended to promote and protect hemp and marijuana. In that year, Polis hosted "Hemp on the Hill" with the Cannabis Caucus, which was the first event of its kind.

Colorado Department of Agriculture

The CDA oversees and promotes agriculture in partnership with other state departments and local governments and through specific programs authorized by the General Assembly. The Commissioner of Agriculture serves as the head of the CDA, working with members of the Colorado Agricultural Commission and other boards or bodies to formulate policy for the state.

In 2015, the CDA became the primary agency responsible for regulating hemp cultivation in Colorado with the creation of the state's pilot industrial hemp program, principally through the Plant Industry and Laboratory Services Divisions. Through those two divisions, CDA regulates producers, provides testing services, and administers a certified seed program, but does not have jurisdiction over the processing, sale, or distribution of the crop. Further, CDA serves as the lead agency regarding the development and administration of the state's industrial hemp plan submitted to USDA under the 2018 Farm Bill and the IFR.

Registration

The CDA registers applicants under the 2014 Farm Bill pilot hemp program and will remain the main regulatory agency for hemp cultivation registration. When the 2018 Farm Bill produced a sharp increase in the number of registration applications, the CDA developed a secure online registration system.

Field Sampling and Testing

The CDA Laboratory Services Division conducts accurate, timely, and legally defensible analysis of various agricultural samples, including industrial hemp, on a random selection basis. The division has established standard operating procedures to handle hemp samples for THC analysis. CDA will continue in this role in sampling and testing hemp for compliant levels of THC and will coordinate and certify third-party field sampling agents to expand sampling coverage.

Seed Certification Support

The CDA Plant Industry Division created the first certified hemp seed program in the nation and helped to develop an industry-leading hemp program. The Colorado Seed Growers Association (CSGA) is the lead certifying agency in Colorado; CDA will continue to support CSGA by providing THC verification as part of the seed certification process.

Colorado Department of Public Health & Environment

CDPHE seeks to advance the health of Coloradans, protecting the places where they live through health and environmental protection programs and activities. CDPHE has overseen the inclusion of hemp in consumable products since 2017, whether as a food ingredient or as a nutritional supplement, through a combination of regulations, policy, and licensing regimes. It is expected that CDPHE will continue to play a role in the Colorado hemp industry under the CHAMP initiative in the manner described below.

Lab Certification and Testing

CDPHE helps manage lab certification for most analytical laboratories in the state for food and environmental testing. CDPHE will serve as the main certifying agency for private labs that test for compliant THC levels in hemp. Approved and certified labs will be required to meet ongoing inspection, testing, and compliance protocols for maintaining certification.

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[3] H. Amdt. 208, 113th Congress (2013–2014).

Processors and Manufacturers

Colorado permits the inclusion of industrial hemp in food and dietary supplements, subject to compliance with CDPHE requirements. CDPHE has adopted applicable FDA regulations, specifically 21 CFR 111 (dietary supplements) and 117 (food), for hemp manufacturers and processors. In addition to these requirements, CDPHE requires that all parts of hemp used in consumable products must come from a hemp producer registered and in good standing with the laws of the jurisdiction where such producer grows hemp, THC must not be above allowable limits, finished products are required to be tested, and the product must meet state labeling requirements.

Marketing and Labeling

CDPHE sets standards for hemp-related product labeling. Hemp products must include certain standard language, including an identity statement, net weight statement, a list of ingredients, and the company name with address. Labels of these products must also clearly identify that hemp is an ingredient; list any CBD content; not make unsubstantiated health, benefit, or disease claims; and include the statement that the "FDA has not evaluated this product for safety or efficacy."

Office of Economic Development and International Trade

OEDIT works with partners to create a positive business climate that encourages dynamic economic development and sustainable job growth. OEDIT strives to advance Colorado's economy through financial and technical assistance that fosters local and regional economic development activities throughout the state. OEDIT's various divisions offer a host of programs and services designed to support the state's business recruitment efforts for domestic and foreign companies evaluating Colorado for relocation or expansion, existing Colorado companies pursuing growth and expansion opportunities, and companies requiring other retention services.

OEDIT's Global Business Development (GBD) division seeks to elevate Colorado businesses and communities by using a data-driven approach to recruit, support, and retain companies and businesses that contribute to a robust and diversified economy. The GBD division has played an integral role within the CHAMP initiative and will continue to promote the Colorado hemp industry.

Economic Development Tools and Programs

OEDIT's financing and incentive programs are comprised of cash incentives, business grants, tax credits, debt, and equity financing among other programs. Past funding and grants have been awarded to companies within the hemp industry. Examples of various OEDIT programs that can support and promote the hemp industry include Enterprise Zone Tax Credits, Opportunity Zone Initiatives, Small Business Initiatives, and other funding programs.

Office of the Attorney General

The Attorney General (AG) and the Department of Law represent and defend the legal interests of the people of the State of Colorado and its sovereignty. The AG exercises the responsibilities given to the office by the Colorado Constitution, statutes enacted by the Colorado General Assembly, and the common law. The AG is the chief legal counsel and advisor to the executive branch of state government, including the Governor, all the departments of state government, and to the many state agencies, boards, and commissions. Both the 2018 Farm Bill and the IFR both contemplate a role for the AG within the state plan; the CDA must consult with the Attorney General in formulating the plan submitted to the USDA, the AG must be notified of intentional violations of the state plan, and the AG has access to real-time data from the USDA.[4]

Colorado Department of Public Safety

The DPS has six divisions that provide public safety services for Colorado communities: Colorado Bureau of Investigation, State Patrol, Division of Criminal Justice, Division of Fire Prevention & Control, Division of Homeland Security and Emergency Management, and the Executive Director's Office. Similar to the Department of Law, the 2018 Farm Bill and the IFR contemplate a role for DPS within the framework for hemp.

Law Enforcement & Public Safety

DPS will have several areas of focus within the state hemp plan. Already, DPS coordinates with local municipal, Tribal, and county law enforcement agencies to meet public safety needs, and that coordination will extend to a variety of hemp con-

[4] IFR at 58532.

cerns, including registration and certification, fire safety, zoning, transportation, and compliance. As part of the requirements in the IFR, obtaining a hemp production license will require the completion of certain background checks, as well as enforcement of state plan elements. It is therefore expected that DPS will continue to foster interagency coordination within statewide law enforcement efforts.

Transportation

The Motor Carrier Safety section will continue to handle various aspects of hemp-related transport activity regarding commercial motor vehicles, including those related to crashes, hazardous materials handling, or any criminal violations. Further, DPS coordinates with law enforcement outside of Colorado to address interstate transportation issues.

Institutions of Higher Education

Colorado State University (CSU) is part of the CHAMP initiative and is actively involved with the collaboration of agencies, academic institutions, and other industry stakeholders in developing the hemp industry in Colorado. Further, CSU staff served with the CDA as lead authors of this report and its findings. In addition to CSU, other Colorado academic institutions will be actively involved in hemp research and workforce development, including the University of Colorado, Adams State University, CSU-Pueblo Institute of Cannabis Research, Fort Lewis College, Colorado Mesa University, Western Colorado University, and the University of Northern Colorado.

Extension Service

CSU Extension works within Colorado communities to provide education, data, and research-based information to the public. Expertise includes agriculture, water, business management, and other topics useful for understanding and building the hemp industry. CSU Extension Service has been instrumental in developing education materials to support hemp production, identifying both the risks and opportunities associated with hemp production, while also performing research intended to close knowledge gaps caused by the decades-long prohibition against hemp production in the United States.

Colorado Department of Regulatory Agencies

DORA announced, along with Governor Polis, the *Roadmap to Cannabis Banking & Financial Services.*[5] The Roadmap stated Colorado's goal, vision, and strategies for improving access to banking, insurance, and other financial services to those in the hemp industry.

With the passage of the 2018 Farm Bill and the submission to the USDA of Colorado's proposed hemp plan, DORA seeks to create a regulatory environment where financial services and insurance are offered to hemp companies on par with other industries, to provide clarity on how state hemp laws and regulations apply to service providers within the financial services and insurance industry, and encourage innovation for emerging technologies and business models that better meet the needs of Colorado's hemp industry stakeholders.

Insurance

DORA's Division of Insurance regulates Colorado insurance companies and serves as a liaison to the National Association of Insurance Commissioners and industry stakeholders. Lack of clarity and understanding of the issues surrounding insurance for hemp companies has led many insurance companies to avoid providing coverage to the industry. It is expected that the Division of Insurance will focus on two key areas under the CHAMP: educating insurance companies on providing coverage for hemp producers and other users of manufactured hemp products; and encouraging underwriters to design products tailored to the industry.

Banking and Financial Services

The Division of Banking regulates state-chartered commercial banks and trust companies, state-licensed money transmitters, and enforces the Public Deposit Protection Act. The Division of Financial Services regulates state-licensed credit unions and savings and loan associations. The Division of Banking and the Division of Financial Services are working with the Federal Reserve System, Federal Deposit Insurance Corporation, and the National Credit Union Administration to offer clarity on how to protect banks and credit unions while building a regulatory environment

[5] Polis Administration Unveils 'Roadmap to Cannabis Banking & Financial Services' (*https://drive.google.com/file/d/1VJSROIpmW9NJkxETlECy0DQw1kCqgcXm/view*).

where state-chartered and licensed financial institutions, money transmitters, and insurance companies can expand services to those in the hemp industry. It is expected that these divisions will seek to partner with CDA, CDPHE, and the Colorado AG's office to ensure continued compliance with state hemp rules and regulations, as well as the continued safety and soundness of institutions that opt to offer financial services to hemp companies.

Colorado Department of Natural Resources—Division of Water Resources

The Division of Water Resources (DWR) administers water rights, issues well permits, represents the state in interstate water compact proceedings, monitors streamflow and water use, issues licenses for well drillers, assures the safe and proper construction of water wells, and maintains numerous databases of Colorado water information. This division ensures Colorado hemp producers obtain a legal water supply for all cultivation activities.

Colorado Department of Revenue—Marijuana Enforcement Division (MED)

The MED of the Colorado DOR regulates the cultivation, production, and sale of marijuana (medical and retail) in Colorado. Representatives from the division participated in the stakeholder meetings that occurred in connection with the development of this report. While hemp producers may not transfer plant material to MED-licensed businesses, manufacturers of hemp-derived products such as extracted cannabinoids can sell inputs to food and storage facilities registered with CDPHE. Such CDPHE-registered businesses may then in turn sell finished products containing hemp derivatives to MED-licensed dispensaries, subject to satisfaction of certain testing and product tracking criteria.

Federally Recognized Indian Tribes

Reservations of the Ute Mountain Ute Tribe (UMUT) and of the Southern Ute Indian Tribe (SUIT) adjoin one another in Southwest Colorado near Mesa Verde National Park. The portion of the UMUT reservation that overlaps with Colorado spans 575,000 contiguous acres extending into New Mexico and Utah, including the 7,700 acre UMUT Farm & Ranch Enterprise at the base of Sleeping Ute Mountain. The 1,064[2] mile SUIT reservation includes high-mountain timberlands in its eastern portion and mesas to the west (closer to UMUT), but no tribally-owned farm and ranch; rather, the Agriculture Division of the SUIT Natural Resources Department works to foster economic opportunities for SUIT members and the Tribe itself on Tribal and allotted lands.

Under the 2014 Farm Bill, Tribes could form arrangements with state higher education and agriculture departments that would permit the production of hemp. The 2018 Farm Bill, by contrast, empowered federally recognized Indian Tribes to assume primary regulatory authority over cultivation, processing, production, and marketing of industrial hemp on Tribal lands. With regards to growers seeking to produce hemp on lands within reservation boundaries, the regulator to whom a grower or manufacturer is subject will depend (much like oil and gas extraction) upon whether such lands are held in fee, owned by the Tribe, or allottees.[6]

Local Government

In 2019, the Colorado General Assembly clarified that local governments have the authority to regulate businesses engaged in the processing, extraction, or manufacturing of hemp. Local governments can regulate businesses involved in the sale of industrial or food products containing hemp, so long as those regulations do not conflict with state law. Local governments continue to play a critical role in the evolution and growth of the Colorado hemp economy. For example, local governments have the opportunity to address zoning, building & fire safety, and other areas that fall within their purview.

The Colorado Municipal League (CML) and Colorado Counties, Inc. (CCI) are nonprofit, nonpartisan organizations providing advocacy, information, and training to Colorado's municipalities and counties, respectively. These local government agencies seek to ensure that the perspectives of municipalities and counties are included in major statewide decisions, including the evolution and growth of the Colorado hemp industry. CML and CCI are actively engaged with the primary goals of maintaining local government authority to regulate businesses and gaining more coordination with the state on issues such as permitting locations for hemp cultivation.

As noted elsewhere in this report, the first step for many cultivators and manufacturers of hemp is to properly register their crop with state agencies. Such busi-

[6] *See, e.g.,* Erin M. Erhardt, *States **Versus** Tribes: The Problem of Multiple Taxation of Non-Indian Oil and Gas Leases on Indian Reservations* (*https://digitalcommons.law.ou.edu/cgi/viewcontent.cgi?article=1032&context=ailr*), 38 AM. INDIAN L. REV. 533 (2014).

nesses must also ensure compliance with local ordinances and zoning laws, and obtain necessary local licenses, where applicable.

Zoning, Fire Code, and Building Safety

Land use codes are implemented at the local level. Local governments can control the production of hemp through local zoning and land use ordinances in the same way they do businesses and other agricultural products. Local governments can designate where hemp may be grown within their jurisdictions through land use and/or zoning authority. Local noise and odor regulations may also apply to the cultivation, production, and storage of hemp products. Given the evolving nature of both the hemp industry and land use laws in Colorado, local governments may seek additional tools in the future to address issues uniquely associated with hemp and/or impacts on adjacent property owners.

Fire safety is of primary concern in the processing and production of hemp products, especially with indoor extraction of CBD oil (considered high risk due to the nature of the materials used in the process). Local governments may develop permit and inspection requirements for these operations to address fire and other safety concerns, which may impose additional requirements not currently required by state law.

Colorado Industry Associations and Other Nonprofits

Industry organizations have proven critical to the thoughtful evolution of policy and regulations enacted by Federal, state, and local agencies and the reemergence of industrial hemp as a nascent industry within Colorado. Such organizations represent the concerns and interests of the stakeholder members to ensure that laws meet both the goals of various governments and the practical needs of the farmers, producers, manufacturers, and ancillary businesses within the industry, while also providing critical resources surrounding the certified seed. The following are key associations that took part in the stakeholder process, listed in alphabetical order.

Colorado Bankers Association

The Colorado Bankers Association (CBA) strives to provide banks with clarity on how to treat hemp-related businesses through ongoing education and advocacy. Banks have been left ensnared in a conflict between state and Federal laws regarding their ability to serve these customers—something CBA continues to work to remedy.

Bankers associations, including CBA, recently called for changes to the USDA IFR that would help facilitate banks offering services to hemp growers and related businesses. The changes include increased ability to verify would-be borrowers legitimacy as well as more flexibility in potency testing for hemp for growers whose crops inadvertently exceed the 0.3 percent threshold, which if not changed could lead to increased financial loss for borrowers and lenders alike. Most recently, CBA advised bankers that they must tailor their anti-money laundering programs to monitor their hemp-growing customers more effectively.

CBA hosts regular forums and educational opportunities to keep its members and, in turn, their customers apprised about ongoing efforts to help them more easily serve hemp businesses, while complying with all state and Federal laws.

Colorado Farm Bureau

The mission of the Colorado Farm Bureau (CFB) is "to advance the interest of the Colorado farm and ranch community" through "research and inquiry into the fields of agriculture, industry, commerce, transportation, economics and political relations." It advances the interests of its members by promoting farming and ranching, providing member resources, and developing school farm programs. Membership representation includes farming, ranching, education, produce, retail, medical, and scientific industries. CFB is actively involved in policy development and advocacy in legislation. CFB announced that it is looking forward to working with the Governor's Office in supporting hemp production and took an active role in CHAMP stakeholder discussions.

Colorado Hemp Industries Association

The Colorado Hemp Industries Association (COHIA) "is a member-driven organization propelling the hemp industry in Colorado through reliable information, public policy work, and agriculture and market development." COHIA has a list of stated goals that include providing grassroots representation, education to the public, and various advocacy and support functions for the hemp industry. COHIA is an active member of the CHAMP initiative and provided comments to the IFR on January 9, 2020, expressing concerns and recommendations for changes that largely mirrored those of the state. The organization provides updates and industry news, conferences and education events, and other tools for supporting hemp businesses, researchers, and supporters.

Colorado Seed Growers Association

Colorado Seed Growers Association (CSGA), located on the campus of Colorado State University, is a nonprofit educational and service organization operated in partnership with CSU Cooperative Extension. CSGA, a member of the Association of Seed Certifying Agencies (AOSCA), is the official seed certifying agency in Colorado and works closely with CDA on the CDA Approved Certified Seed program. Certification is expected to continue through CSGA by following standards set by the AOSCA which comply with the Federal Seed Act and Colorado Seed Act.

Hemp Feed Coalition

The Hemp Feed Coalition (HFC) emerged from the *2018 Hemp in Animal Feed Report* completed by CDA. After completion of the report, the Coalition was created by multiple industry stakeholders including the hemp industry, Feed Processors and formulators, animal producers, feed regulators, and animal experts. The HFC is working to gain Federal regulatory approval for hemp as an animal feed ingredient through education, research, and completion of applications submitted to the FDA and Association of American Feed Control Officials. The secondary goals of the HFC are to: establish new markets for hemp and its products and the creation of a secure supply chain; and support research into the safety and efficacy of hemp which is necessary to secure a position for hemp as an ingredient in feed, both for production animals and pets.

Rocky Mountain Farmers Union

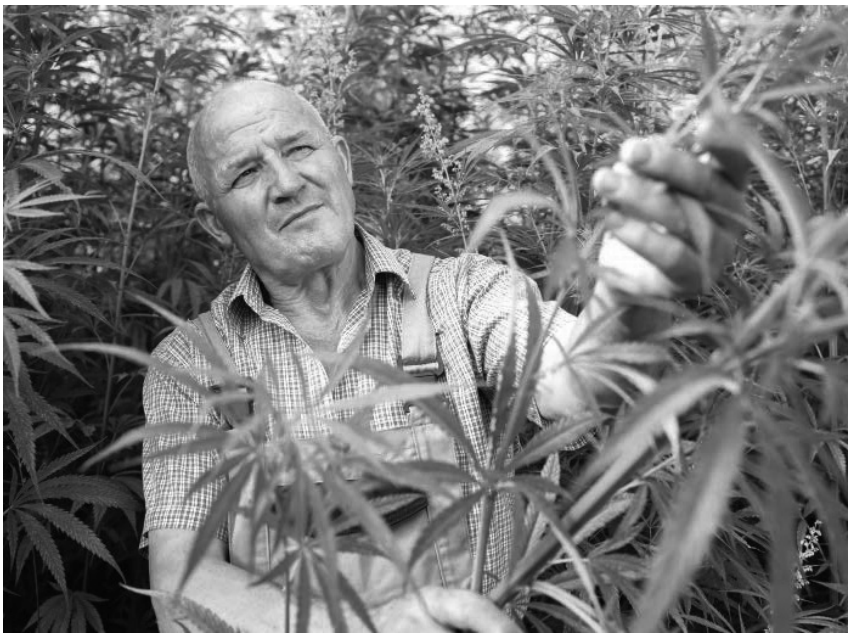
Rocky Mountain Farmers Union (RMFU) is a cooperative enterprise described as a grassroots organization that advocates for family farmers and ranchers, communities, and consumers in Colorado, New Mexico, and Wyoming. RMFU focuses on educational, legislative, and cooperation programs, and also participates in developing legislative proposals to support member interests. RMFU was active in supporting Amendment X, a Colorado state constitutional amendment that changed the definition of industrial hemp to match Federal law. In 2019, RMFU policies included support for removal of hemp from the CSA, an end to restrictions surrounding the transportation and importation of hemp seeds and live hemp plants across both state and Federal boundaries, recognition of hemp as a specialty agricultural crop, research into the various potential uses of hemp, the formation of hemp cooperatives, and other legislative support in the development of the hemp industry. RMFU continues to emphasize hemp as an important topic at educational workshops and symposiums and is also actively involved in advocacy, educational outreach, and promotion of hemp as an agricultural commodity.

Section 2. Stakeholder Recommendations

Recommendation Summary

The CHAMP stakeholder process resulted in 21 recommendations that span eight links in the hemp industry supply chain. A list of the recommendations is included

below. Each recommendation in this section includes the legal basis and purpose for the policy recommendation; information on existing regulatory and supportive practices and on new regulatory programs; and guidance on implementation, including needs for new legislation, rulemaking, programs and procedures.[7]

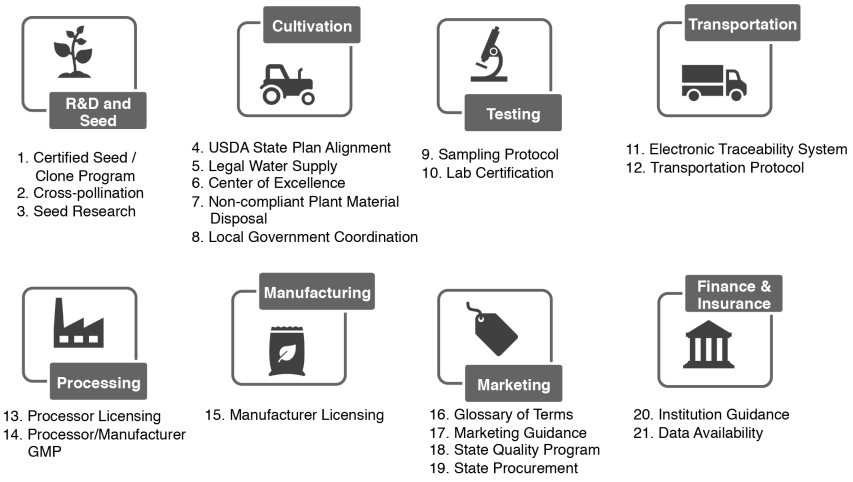


The recommendations result from an initial identification of important topics by the CHAMP executive committee, and then three meetings for each stakeholder group where stakeholders further identified and specified key regulatory topics and practices.

Each recommendation was then further refined to include the policy or position; education or research required; action items; and key resources required for implementation. *Figure 8* shows the stakeholder groups and recommended deliverables.

[7] At the conclusion of the stakeholder discussions the groups produced 45 draft deliverables that function as policy recommendations. These were combined to form 21 core regulatory objectives highlighted in *Figure 8.*

Figure 8. Stakeholder Recommendation



Market-Level Principles Across the Supply Chain

There were several recurring regulatory principles that emerged from the stakeholder groups, documented below. These principles will be noted throughout the recommendations, and a holistic approach to each is essential to creating a successful hemp regulatory program.

Principle 1: Promote Economic Development Across the Supply Chain

Colorado State Government, primarily through OEDIT, continuously seeks to establish, recruit, support, and retain businesses that provide the right jobs for Colorado and that contribute to a robust and diversified economy. In keeping with that mission, OEDIT offers a variety of programs that seek to draw, maintain, and expand the presence of employers in Colorado.

Several of Governor Polis's "Wildly Important" Goals for Fiscal Year 2021 focus on the advancement of the hemp industry, including goals to increase Colorado hemp production space; increase business startups in rural Colorado; initiate a hemp working group with industry stakeholders to explore additional ways to support the growth of the industry in rural areas; and increase Colorado hemp producers' commodity market share through increased business partnerships. OEDIT has also sought to actively integrate hemp into its existing toolbox of incentives, technical support, and investment. Several programs could be available to hemp cultivators, processors, and manufacturers.

Hemp companies may fit into OEDIT's classification of advanced manufacturing, or may be considered a target industry that provides desirable employment opportunities, and could be eligible for many OEDIT programs. Hemp production operations may also be located in areas eligible for rural economic development incentives. OEDIT programs appropriate for hemp businesses may include (but are not limited to):

- **Skill advance Colorado.** Grants for the training or retraining of employees of businesses relocating to or expanding in Colorado; or for established companies to reinvest in their workforce to remain competitive. Awarded for net new job creation.
- **Colorado microloans.** Grants for nonprofit lenders to make loans to businesses not otherwise served by traditional credit markets.
- **Job growth incentive tax credit.** Tax credit for businesses pursuing competitive expansion initiatives that provide at least 20 new jobs.
- **Enterprise zone.** State income tax credits for businesses to locate and expand in economically disadvantaged areas.
- **Opportunity zone (Federal).** Tax credit for investors in low-income communities throughout the state that offers tax forgiveness on capital gains and favorable treatment of reinvested capital gains.

- **Strategic fund incentive.** An incentive program that offers an even cash match for businesses that create and maintain permanent net new jobs.
- **Advanced industries incentive/accelerator program.** Grants, tax credits, seed funding and job training programs for advanced manufacturing, aerospace, bioscience, electronics, energy and natural resources, infrastructure engineering, and technology/information businesses.
- **Small business development center.** Fifteen technical assistance centers across the state that offer a network of mentors and consultants provide no-cost consulting and low-cost training and workshops to entrepreneurs and small businesses.
- **Venture capital authority.** Publicly supported investment funds that provide equity and debt investments in early-stage companies.
- **Promotion.** OEDIT seeks to elevate the profile of Colorado businesses and communities throughout the world. OEDIT will continue to promote the Colorado hemp industry under its mission.

The programs above may require that businesses meet several criteria, whether through a competitive application process, new job creation metrics, or locating inside specific zones targeted for economic development. Hemp companies are encouraged to participate alongside all other current or prospective Colorado companies, and all hemp companies are eligible for technical assistance and for programs designed to support new job creation, especially in disadvantaged zones targeted for economic development.

The CHAMP industry analysis (*Appendix B*) and stakeholder discussion underlined the need for a broad initiative to increase research and awareness of the industrial and consumer uses of hemp products and extracts. Research and development of new uses and the reinvigoration of traditional uses will drive future investment in scalable processing facilities that could locate in Colorado as national demand for hemp products increases.

Advanced manufacturing facilities can serve a national or international market and would require a reliable source of raw hemp fiber or grain as inputs, thus benefiting local agricultural communities. Intellectual property that will drive the industry through new varietals, products, and manufacturing processes is of equal importance as a key industry value component.

As a result, research and development and processing capacity are all vital for the advancement of Colorado hemp. A coordinated public economic development effort like the CHAMP often will signal and incentivize further private investment in hemp production, processing, and manufacturing.

Principle 2: Chain of Custody & Information Sharing Systems Will Drive an Expanding Hemp Industry

One key item considered for registered hemp industry participants is a traceability system that creates a chain of custody beginning at harvest and continuing to the final end-product, including documentation for all transactions and transport. A traceability system that provides an uninterrupted chain of custody between registered entities could assist in Federal regulatory compliance, food safety, and interstate commerce; and could allow for unencumbered interstate transportation in the future. It could also bolster consumer confidence in hemp end-products.

It is expected that chain of custody entries and documents will allow for seamless trade and transportation of hemp across the state and multiple jurisdictions, and for law enforcement to distinguish registered, compliant hemp from other cargo in transport. The traceability system would also support potential future development of the Colorado regulatory scheme which, depending on the Federal regulatory environment, could include post-harvest testing, a THC remediation program, and food safety functions like foodborne pathogen identification or product recalls.

Principle 3: Focus on THC Control

Controlling THC in hemp plants and products is important to ensure compliance with Federal regulations. Colorado is experienced in regulating THC as one of the first states to develop a regulated commercial cannabis framework in 2014. CDA officially regulates the control of THC for hemp products up to the farm gate to conform to the state and Federal definition of hemp. In addition, Colorado has also pioneered the use of certified seed to provide farmers the choice to use known genetics with low THC level. Looking toward the future, Colorado is interested in exploring the remediation of THC (as soon as federally permissible) to produce safe and efficient options for non-compliant plant material to meet the 0.3 percent THC requirement.

Principle 4: Recognize the Importance of Federal Compatibility While Also Advocating for Reasonable Regulations

The Colorado hemp program must comply with Federal laws and regulations, including any forthcoming Federal laws and USDA, FDA, DEA, the Federal Trade Commission (FTC) and other agency rules; at the same time, stakeholders in Colorado will continue to advocate for the rules and policies developed as part of the CHAMP initiative. Some policies included in this report are long term objectives and are more forward-looking than current Federal law and will need to be implemented as Federal law and rules evolve. While Federal compatibility is important to establish national standards, Colorado should continue to advocate for appropriate and reasonable Federal regulations that allow for advancement of the industry, while at the same time, maintaining a level of public safety.

Principle 5: Recognize the Importance of Intergovernmental Coordination

Close coordination with state, Tribal, and local governments and law enforcement agencies will ensure that compliant cultivation and manufacturing businesses can operate efficiently and transport hemp without unnecessary delay. Interstate and Tribal government communications will be crucial for transport across Tribal/state boundaries. Tribal and local government and law enforcement will be granted access to state electronic registration and other records, for any regulatory activity, through the establishment of a Memorandum of Understanding (MOU) that private or proprietary information will be kept confidential.

Principle 6: Promote Access to Finance and Insurance Services Across the Supply Chain

All businesses require stable access to standard finance and insurance products. Ensuring comparable access to financial services and insurance for hemp is essential for industry development and will help businesses achieve stability in its early years, where markets are often fragmented and volatile. Colorado can be a leader for guidance and outreach to institutions seeking to serve the evolving marketplace and facilitate the provision of services in a manner similar to other agricultural products.

A corollary issue arising out of stakeholder meetings may require state involvement or public-private partnerships; namely, that Federal crop insurance does not cover non-compliant material like other agricultural products that banks look to for underwriting and risk management purposes. The state should deepen partnerships to resolve this issue in a manner intended to eliminate coverage shortfalls. Forward progress is expected to require multi-department coordination with support from the Governor's Office, DORA, state, and Federal legislators, and as Members of the Colorado Congressional Delegation and Tribal leaders.

Principle 7: Promote Equity, Diversity, and Inclusion Across the Supply Chain

As the industry continues to grow, Colorado should commit to making the Colorado hemp industry a model for equity, diversity, and inclusions (EDI). Direct initiatives should be made to promote the diversity and inclusion of emerging businesses in farming, manufacturing, and retail sectors. Any large initiatives to advance the industry should be examined through an EDI lens to promote the inclusion of those who have historically been underrepresented. Colorado should focus on increasing hiring, access to funding, promoting a diverse culture, stakeholder outreach and education.

Stakeholder Recommended Deliverables

Identification of key recommended deliverables through the stakeholder process was the driving focus of the CHAMP initiative. The following stakeholder recommendations represent a general consensus among stakeholders regarding sensible and forward-looking deliverables intended to bolster Colorado's hemp industry. Alternative viewpoints for certain deliverables are noted where appropriate. However, it is important to note that implementation is conditional on the market need, Federal regulatory environment, procurement of resources, including increased staff and funding, as well the passage of legislation and production of rules and regulations. Dynamic changes are still occurring for the hemp industry, particularly regarding market conditions and Federal regulations. Moreover, the impact of the COVID–19 pandemic will most likely have an adverse impact on funding, staffing, and other resources.

Consequently, while these recommendations represent a general consensus of the stakeholders, including the agencies that will implement the deliverables, some of these recommendations may be difficult to implement, require adjustments, or may be delayed based on the factors mentioned above.

Each recommendation is organized as follows:

- A short concept summary
- The basis and purpose of the recommendation
- The regulatory program:
  - current program—describes a current program that will be expanded or replaced
  - existing program—describes a program that will largely remain the same
  - recommended enhancement—describes a new, expanded, or enhanced program
- Implementation steps
- Key government, institutional and industry stakeholders

Recommendations are further organized by the supply chain area and follow the product from seed to market. The following comprise the 21 final recommendations derived from the CHAMP stakeholder proceedings and from public input taken at state events held in 2019 and 2020.

R&D and Seed Recommendations

1. Certified Seed and Clone Program

Stakeholder Recommendation

Support research and development to provide stable genetics and increase the availability of varieties that will consistently meet THC compliance regulations. Continue to allow the use of open source seeds in Colorado.

Expand the current hemp seed certification program to include standard and feminized seed, encourage national adoption of THC verification as part of hemp seed and clone certification. Encourage private industry and institutions of higher education to develop state hemp varieties. While currently allowed, stakeholders recommend Colorado continue to allow the use of open source seeds.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is CRS § 35–27–102 (Colorado Seed Act). The Colorado Seed Act is implemented by 8 CCR 1203–6.

A certification program provides a path to verify identity and protect traits in the seed. Seed certification is one method used to distinguish identity, along with Plant Variety Protection certificates, patents, and utility patents. The U.S. seed certification program is part of the Federal Seed Act but is carried out by individual state agencies, state departments of agriculture or crop improvement associations. These

agencies are coordinated through the AOSCA. In Colorado, the CSGA is the official seed certifying agency and an AOSCA member.

Certified seed and clones assure the buyer (and end-user) of the genetic identity and characteristics of the products being purchased. A robust certification program protects producers against inaccurate or misleading labeling, which can cause severe economic hardship due to low crop yields, high THC concentrations, poor crop quality, and the spread of noxious weed seed. Under current market conditions, Colorado producers have experienced a shortage in reliable hemp seed sources, inflated seed prices, and a concerning amount of seed sold by predatory sellers using false information.

Regulatory Program

Current Program. The hemp seed certification program is operated by CSGA. CDA provides THC testing for the program. To certify seed, a CSGA hemp varietal review board must deem the entrant to be a genetically distinct, uniform, and stable plant variety. Then, the CSU Experiment Station plants the variety in several locations across the state in trials to prove the applicant claims in varying soil, altitude, and general environment. CDA then tests for THC content and the CSU seed laboratory tests to verify all other applicant claims (*i.e.,* purity, yield, noxious weed presence, *etc.*) for variety stability. The initial single-season trial occurs at four experiment station locations throughout Colorado. Each subsequent year a variety is certified and labeled under the CDA Approved Certified Seed program, CSGA inspects every seed production field prior to harvest. THC verification, completed by CDA, will also occur annually for producers of certified seed.

Recommended Enhancement. The features of an enhanced hemp seed certification program, including the certification process and certifying agencies, will largely remain the same. Stakeholders recommended that CSGA evaluate the expansion of the certification program to include a clonal certification program (pilot starting in 2020) and a feminized seed certification program (in process). Key features of the hemp certified seed program would include:

- **Certifying agencies and general process.** Tax Hemp certification should continue to be administered by CSGA and will follow generally accepted AOSCA standards and comply with the Federal Seed Act and the Colorado Seed Act. The current process for seed certification will remain the same, including the varietal review, testing, and labeling procedures described above.
- **THC verification.** CDA and designated state-certified THC testing labs should provide THC verification and testing for the seed certification program.
- **Feminized seed.** CSGA and AOSCA certified agencies expand existing hemp certification standards to include feminized seed for accepted varietals. CSGA should work with stakeholder groups to develop and adopt standards for feminized hemp seed breeding and production, including the use of chemical applications to produce female pollen and feminized seed. Feminized seed will be certified only if it has gone through a standard AOSCA certification process for genetic identity and purity, and the additional requirements needed to verify proper feminization procedures. CSGA should harmonize their procedures with AOSCA once there are international guidelines for feminized seed.
- **Certified clone program.** CSGA should work with AOSCA certified agencies to evaluate the feasibility and enterprise structure to establish a certified clone program. A genetic certification process for clones would be similar to seed certification, where plants enter a varietal review and are grown full term, in multiple conditions over multiple seasons to verify identity, purity and select traits. Definitions for foundation, registered and certified genetic stock would be developed by CSGA.
- **Open source hemp genetics.** CDA should continue to allow hemp genetics from any source to be grown and harvested in Colorado if it meets the definitions described in 8 CCR 1203–23. Open source genetics mean any seed or clone produced by the plant *Cannabis sativa* L. that possesses a THC content less than or equal to 0.3 percent tested according to CDA regulations; and is not patented, certified, or otherwise protected. Any open source seed can be entered to become certified if it can pass the required trial process.

Implementation

The following action items are needed to implement this recommendation:

- THC verification program—pending any expected AOSCA action—standards development, testing and trial procedures, labeling standards;

- Feminized seed certification program—pending AOSCA action—testing and trial procedures, labeling standards;
- Clone certification program—pending AOSCA action—standards development, testing and trial procedures, labeling standards; and
- Develop task force to determine need, feasibility, operating model, and funding.

Key Stakeholders

CDA, CSU, CSGA, AOSCA, other seed certification agencies, Colorado hemp farming and seed breeding industry and associations.

2. Reduce Cross-Pollination Through Information Sharing

Stakeholder Recommendation

Allow CDA to provide limited information on the presence of hemp farms to other nearby hemp producers to help minimize cross-pollination between different varieties of hemp, and between hemp and marijuana plants, that may lead to unwanted traits or non-compliant crops. On a long-term basis, stakeholders recommend that researchers, including the Center the Excellence, explore ways to mitigate cross-pollination issues.

Basis & Purpose of Recommendation

The statutory basis for these recommendations is found in CRS § 35–61–104 and implemented by CCR 1203–23. Such laws and regulations define and describe the registration process for hemp producers, including registration requirements, information collection, and reporting requirements.

Developing cross-pollination reporting provides information to hemp producers who might be susceptible to cross-pollination from other nearby hemp fields, so they can make informed decisions about registering their lots and protecting their crops.

Seed, fiber, and cannabinoid producers choose their crop location without the ability to understand the local cross-pollination risk factors, *i.e.,* other nearby hemp crops that may produce pollen. An information program, where producers are notified of how many hemp crops are located nearby (*i.e.,* within a certain radius in miles) may help in risk mitigation, where pollination can significantly reduce the value of certain hemp crops.

The impact of cross-pollination will continue to be an obstacle that hemp growers face. The stakeholders determined this specific issue should be a prioritized area a Center of Excellence (described in recommendation 6) should research.

Regulatory Program

Current Program. There is no current program directly addressing information sharing to minimize cross-pollination. Anonymized information on the presence of nearby hemp registrants is provided to other registrants on an as-requested basis. CDA does not restrict or prohibit registered locations if they comply with all state and Federal hemp laws.

Recommended Enhancement. The hemp producer registration program administered by CDA collects information on location, variety, and intended end use of each hemp crop. This information could be combined with GPS data to create a notification to producers whether their proposed dioecious or feminized crop is within a predetermined distance of another registered hemp lot.

Stakeholders recommended CDA establish a service to inform hemp farmers if other registered hemp fields are within a certain defined distance, thus potentially posing a cross-pollination threat. The producer could request a report during registration to see if other hemp lots are registered nearby and an update notification if another hemp lot is registered after the producer's initial registration. To maintain confidentiality requirements, the CDA would simply report to affected producers whether (and how many) other hemp fields exist within the defined distance. When possible, the stakeholders' visioned the system would be automated based on technological capabilities of the CDA database.

In the longer-term, the stakeholders recommended Colorado research institutions, including the Center of Excellence, focus on research factors that affect cross-pollination risks, such as proximity, geography, climate, pollen viability, presence of hemp genetic research facilities, and other factors to develop cross-pollination risk standards.

The consensus from the stakeholders indicated that Colorado should continue to not restrict or prohibit registered locations if they comply with all state and Federal hemp laws.

Implementation

The following action items are needed to implement this recommendation. Items include responsible agencies, estimates of required budget and funding sources, and additional staff where applicable:

- New procedures establishing the by-request information program while protecting producers' confidential information;
- Adopt research-determined definitions for physical distances at which cross-pollination poses a risk; and
- Evaluate the feasibility of an automated notification system for cross-pollination.

Key Stakeholders

CDA, Colorado higher education institutions, Center of Excellence, Cooperative Extension Service, and other research institutions.

3. Expand Genetic Research and Establish Plant Breeding Regulations

Stakeholder Recommendation

Establish regulations and a registration program specific to hemp plant breeding and genetic research. This program would allow and encourage research to improve the quality and uniformity of seed genetics and supply for the state's producers, without restrictive THC content rules that would otherwise place them in violation of the broader hemp production regulations.

Basis & Purpose of Recommendation

The purpose of developing separate regulations specific to seed and clone R&D is to allow plant breeders and researchers to conduct research activities that are conducive to atypical production models and processes such as continuous planting and culling, as well as generation of plant material in possible violation of the THC requirements. Because plant breeding requires trial and error across multiple generations before genetics are stabilized and predictable, a separate set of regulations for these registrants is necessary to allow them the flexibility to conduct this research in good faith without the threat of penalties.

Current Federal rules under the IFR include no special provisions for genetic research & development or for plant breeding. To implement this recommendation, the Federal rules would need to allow for this to occur. CDA would implement this recommendation to the extent feasible and after consultation with the USDA.

Regulatory Program

Current Program. CDA has allowed genetic research under the rules established in the 2014 Farm Bill and by rule in 8 CCR 1203–23. This program will be impacted in the near term given the omission of specific research and development rules in the current IFR. Colorado Senate Bill 20–197 amends CRS § 35–61–104 to include a separate research and development registration and regulations "except as otherwise prohibited by law." CDA should develop specific rules for genetic research and development once compatible with Federal law and USDA rules.

Recommended Enhancement. Stakeholders recommended the CDA develop an industrial hemp research and development regulatory program, once it is federally permissible, where the purpose of the research may include growing industrial hemp to provide varieties to aid Colorado's industrial hemp program.

The new program would build upon the established research and development program rules to further advance an operational regulatory framework specifically allowing for effective and innovative seed production and genetic research.

- **Policy Formation.** CDA should convene a multidisciplinary panel, which includes regulatory agents, industry experts, and research professionals, that will work with CDA to establish a set of regulations for the new hemp R&D and plant breeding program.
- **Operation and Enforcement.** CDA should integrate the new program into its operations and staff and enforce the new regulations as they do all other hemp production rules.

The program would feature tailored regulations and qualifications that allow plant breeders and genetic researchers to retain plants with non-compliant THC levels for further breeding and research if they show other desirable traits, assuming THC will be bred lower in further generations.

Implementation

The following action items are needed to implement this recommendation. Items include:

- Rules and definitions specific to seed research and development operations, including eligibility and regulatory requirements;
- Genetic research and plant breeding registration application, inspection, enforcement, and disposal program; and
- Integration with seed/clone certification program.

Key Stakeholders

CDA, Colorado higher education and other research institutions, Center of Excellence, seed breeding and genetic research industry, CSGA.

Cultivation Recommendations

4. Create an Innovative and Flexible Colorado State Hemp Plan that Aligns with Federal Regulations

Stakeholder Recommendation

Stakeholders recommend Colorado align state hemp regulatory practice with USDA requirements to the extent that it ensures a properly functioning regulatory system for the Colorado hemp industry. However, stakeholders overwhelmingly recommend that Colorado continue to advocate for appropriate changes to Federal law.

Basis & Purpose of Recommendation

During the 2019 legislative session, Colorado's General Assembly amended the Industrial Hemp Regulatory Program Act to authorize the Commissioner of Agriculture to consult with any stakeholders and to mandate the Commissioner of Agriculture to consult with private industry in drafting a hemp management plan to be submitted to USDA. (CRS § 35–61–104(6), (Colo. Session Laws 2019, ch. 350 (enacting SB19–220))).

The 2018 Farm Bill and the IFR require each state that desires to have primary regulatory authority over the production of hemp within its state to submit a management plan to USDA that outlines how the state will regulate various aspects of hemp cultivation. After the enactment of the 2018 Farm Bill, USDA published nine requirements for states that intend to develop an industrial hemp regulatory program. In October 2019, USDA issued the IFR to further specify the requirements for state hemp plans. USDA has indicated the IFR will likely be revised to create more flexibility for hemp cultivation when it issues a final rule in 2021.

The Colorado state plan describes how the State of Colorado intends to implement USDA's regulatory requirements through existing and updated statutory authorities, rules, and procedures. All authorities described in the plan are in effect or are intended to take effect after USDA approval, and are intended to govern Colorado's industrial hemp industry.

Regulatory Program

Current Program. CDA currently operates a regulatory framework for industrial hemp cultivation under CRS § 35–61–101 *et. seq.* and 8 CCR 1203–23.

Recommended Enhancement. Colorado Senate Bill 20–197 aligns state statute with Federal Law and Colorado's state plan aligns with the IFR. However, based on stakeholder comments, Colorado submitted comments to the USDA in January and October 2020 and a draft state plan in June 2020 that outlined regulations that requested to depart from the IFR requirements in several key areas. Colorado will continue to advocate for changes in the Federal rules so that hemp growers have the flexibility they need to succeed in growing their businesses.

CDA submitted the state plan to USDA on June 18, 2020 and expects Federal policy will become clearer in 2021.

Implementation

The following action items are needed to implement this recommendation. Items include:

- Legislation and rules to allow, create, and implement post-harvest sampling; remediation program (when federally legal), and third-party lab certification; and
- Procedures for post-harvest sampling, third-party field sampling, and remediation program.

Key Stakeholders

CDA, CDPHE, analytical labs, and Colorado hemp cultivators[.]

5. Verify Registrants Have Access to a Legal Water Supply

Stakeholder Recommendation

Stakeholders recommended an update to the CDA registration process to check if hemp registrants have, or will obtain, a legal water source before planting hemp. In a coordinated and separate process between agencies, CDA could provide DWR with specific information from the registrant's application so that DWR might review the proposed water supply and provide a letter with their findings to the registrant that indicates whether the proposed water supply is legal for planned irrigation use.

Basis & Purpose of Recommendation

The basis for the hemp registration program is found in CRS § 35–61–104 and detailed in 8 CCR 1203–23–2. These statutes define and describe the registration process for hemp producers including registration requirements, information collection, and reporting requirements. DWR's exclusive authority for administering and distributing the waters of the state are described in CRS § 37–92–301(1) and 37–92–501(1). Stakeholders recommended that CDA should provide DWR information on hemp registrants under a MOU to facilitate compliance with DWR statute.

The purpose of developing this procedure is to notify registrants to have a legal water supply and to ensure that registrants may operate without potential shutdown because of orders from DWR. This new procedure will help inform new producers to secure a legal water supply before planting.

Regulatory Program

Current Program. The current registration application process does not include language or guidance regarding the legal water supply for hemp production.

Recommended Enhancement. CDA should explore ways to incorporate a process of referral to DWR during the registration application process. Stakeholders recommend that the application could specifically request the registrant state which of four types of water supplies will be used in the operation, and the registrant would provide additional information based on the water supply type selected:

- Municipal supply (Provider)
- Surface Water Right (water right and share or percent of ownership)
- Well (Permit #)
- Hauled Water (Provider)

DWR could evaluate water supplies according to their procedure and notify the registrant whether the proposed water supply is legal for industrial hemp production. DWR's comments on the registrant's water supply will not prevent CDA from issuing a registration to the producer.

Implementation

The following action items are needed to implement this recommendation. Items include:

- Discussion between CDA and DWR on legal aspects of developing collaborative approach to gather and share information across agencies;
- Water supply data fields added to the registration application for applicants to submit their proposed water supply plans; and
- Information exchange MOU to confidentially send data from CDA to DWR.[8]

Key Stakeholders

CDA, DNR–DWR, Colorado hemp cultivators[.]

6. Establish a Center of Excellence

Stakeholder Recommendation

The state should facilitate a public-private partnership between academic institutions, industry, state agencies, and stakeholders to establish a Colorado Hemp Center of Excellence to accelerate education, research and development in hemp science and technology.

A Center of Excellence refers to a collaboration of numerous academic, private, and government institutions that combine their skills and resources to guide the industry on innovation, best practices, novel research, market-ready applications, funding support, and educational training programs.

The mission of the Center of Excellence will be to serve as a statewide liaison for the Colorado hemp industry by fostering collaboration, resource-sharing, and communication among its regulatory, academic, and industry partners in the research development efforts. In addition, stakeholders suggested the Center will also serve as an "Educational Hub" that will provide technical assistance and educational resources for hemp growers. The Center should also share updates on the industry and findings from its research activities through a publicly accessible website that can provide links to verifiable resources and regulatory information.

Basis & Purpose of Recommendation

The basis for this recommendation follows from the recommendations of the industrial hemp advisory committee created under CRS § 35–61–103; the task force created under Senate Bill 18–235; and the consensus that emerged from the CHAMP stakeholder process.

A collaborative governing body between CDA, institutions of higher education, CSU Extension, OEDIT, the Governor's Office, and other local governmental, nonprofits, private organizations, or individuals, will identify important research areas, conduct relevant studies, and develop educational resources unique to the Colorado hemp industry.

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[8] CRS § 24–2–108—For the convenience of the citizens of this state and to promote economy in state government, it is the intent of the general assembly that all principal departments, when feasible and not contrary to Federal or state law, shall share as much information as possible and, when reasonably feasible to do so, shall coordinate forms, both Federal and state, and shall eliminate multiple mailings to addressees.

Regulatory Program

Current Program. There is no current coordinated, dedicated research institution for industrial hemp in Colorado. However, research and development activities currently occur in private corporations, and in universities across the state.

Recommended Enhancement. Stakeholders suggested the Center of Excellence represent a flagship institution for the industry, formed as a collaboration between Colorado Government, academic institutions, and private organizations to leverage their combined research capabilities and resources. The Center will serve as a statewide liaison for hemp industry stakeholders, striving to support economic vitality and advocating for industry advancement.

Government agencies that could play a major role in the foundation and operation of the Center of Excellence include CDA, OEDIT, and the Governor's Office. Other state and local government agencies may also be engaged where their expertise is appropriate.

Among Colorado's academic institutions, stakeholders believe that CSU will play a large role in the establishment and operation of the Center of Excellence; however, other universities and departments will be heavily involved in leveraging funding, research capacity, and efficiencies. Additional potential academic partners include, but are not limited to, the University of Colorado-Boulder, Colorado Mesa University, CSU-Pueblo, Fort Lewis College, Western Colorado University, Northeastern Junior College, and Adams State University. This collaborative academic model has been effective in renewable energy research in Colorado.

Hemp industry organizations, businesses, and individuals with a focus on research and development should also be selected as Center of Excellence partners as determined through the Center's governance structure.

A primary responsibility of the Center of Excellence would be to apply for Federal funding and distribute matching state funds for developmental projects. Funding from the Center of Excellence could be provided for private businesses, institutions of higher learning, government agencies, Tribal governments, and other qualified research organizations for qualified research programs. A research agenda could include regulatory compliance, genetic research, industrial applications, and best practices relating to the cultivation of industrial hemp fiber, seed, and cannabinoid crops.

Implementation

The following action items are needed to implement this recommendation. Items include:

- Define a governance structure for the Center of Excellence partners. An emphasis will be placed on those with significant experience providing educational information and programs in an agricultural context.
- Define organizational structure and positions for startup and operations.
- Establish funding structure for administration, research, and educational programs; determine Federal and other funding sources available

Key Stakeholders

CDA, CDPHE, Colorado universities, OEDIT, Tribal governments, Colorado hemp industry, other industries[.]

7. Non-Compliant Plant Material

Stakeholder Recommendation

Follow USDA rules for non-compliant plant material disposal to ensure it is properly destroyed and does not enter the market. However, advocate for and adopt rules to test and dispose of non-compliant plant material that preserves value in the supply chain, including post-harvest testing, exemption of non-THC containing stalks and seeds from destruction, and explore the feasibility of further remediation procedures.

It is important to note that there were some stakeholders who were opposed to developing a process in which non-compliant plant material could become compliant and enter the market. Their concern was this option would unfairly reward producers who produce non-compliant plant material; thus, creating a disincentive for producers to ensure their crops are compliant prior to harvesting. Should the state continue to explore this recommendation, additional discussion with stakeholders is warranted.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is 8 CCR 1203–23–5, which indicates that non-compliant plant material must be "destroyed or utilized on-site in a manner approved of and verified by the Commissioner" to avoid revocation or suspension of a registration.

The purpose of the state's non-compliant plant material disposal regulations is to ensure that crops that are not compliant with all state and Federal rules do not enter the chain of commerce and are disposed of under Federal and state requirements. CDA should review and adopt enhanced procedures via rulemaking requiring producers to report, document, and produce evidence of any non-compliant plant material destruction as required by Federal rules.

In lots that conclusively test higher than 0.3 percent THC, "non-compliant plant material" refers to the parts of the plant that are officially considered "marijuana" according to the CSA.[9] Non-compliant plant material does not refer to the parts of cannabis plants that fall outside of the Federal definition of marijuana, which includes the sterilized seeds and mature stalks of the plant and any products or derivatives produced from those parts of the plant. These parts of the cannabis plant are always compliant according to the CSA, regardless of other plant characteristics. Stakeholders recommended that Colorado take a leading role and explore an exemption of seeds and stalks from the destruction of any hemp crop that exceeds the 0.3 percent THC limit.

If federally permissible, the state should consider creating a post-harvest sampling and testing program to protect producers against the unnecessary destruction of valuable plant material and associated economic loss. This program will be available only to qualifying producers with certified or pre-approved varieties with in-field pre-harvest test results indicating non-compliant THC content. This secondary testing program provides producers an opportunity to re-test a homogenized and representative sample of their plant material. Post-harvest sampling and testing would serve as the final determination as to whether a crop has a compliant THC content below 0.3 percent.

In addition, if USDA rules permit, CDA and CDPHE should consider establishing a program to provide effective and safe industrial processing of stalks and seeds and/or removal and remediation of THC from hemp plants that test non-compliant. This "Hemp Value Retention Program" will bring needed certainty and predictability to the industry while hemp genetics improve and stabilize. It will drastically reduce the amount of product destruction and improve investment in all facets of the hemp industry.

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[9] 21 U.S.C. § 802(16).

Regulatory Program

Current Program. Under Colorado's rules, if an in-field pre-harvest sample tests non-compliant with THC greater than 0.3 percent, CDA issues notice to affected producers describing their permissible disposal options. Communication to registrants with hemp lots that exceed the maximum THC threshold explicitly notes that under CDA rules, the crop is prohibited from:

- Leaving the registered land area;
- Entering the stream of commerce; and
- Being used for human or animal consumption.

The rules provide that all crops with non-compliant THC levels must be "destroyed or utilized onsite in a manner approved of and verified by the Commissioner." (8 CCR 1203–23, (Rule 5.2)) Approved disposal/utilization methods include disking the crop into the ground, mulching, composting, burning, and burying. These destruction methods are aligned with 21 CFR 1317.15 and 1317.90, which require that controlled substances be rendered non-recognizable and irretrievable, while also keeping environmental considerations in mind.

Recommended Enhancement. Colorado should continue to ensure legal disposal remains in compliance with Federal law and appropriate enforcement action is taken. While remaining federally compliant, Colorado should advocate for alternative disposal methods that provide farmers means of economic recovery, like clarifying exemptions of mature stalks and seeds of hemp plants from destruction; and having restricted and monitored THC remediation programs. These programs will mitigate financial risk for hemp producers while ensuring that non-compliant plant material does not enter the market for human and animal consumption. While the state intends to comply with Federal law, Colorado should advocate for the policies below to be federally permissible.[10]

Allowance for Post-Harvest Testing

If Federal laws permit, CDA should update its rules to allow for post-harvest sampling as the conclusive determination as to whether the plant material is compliant, contingent upon the use of certified or pre-approved varieties.

CDA would create a post-harvest sampling and testing program to conclusively determine if a full representation of the plant material intended for the stream of commerce is non-compliant. If this post-harvest sample tests less than 0.3 percent THC, the result would be considered official and the crop will be considered compliant and allowed to enter the stream of commerce.

If a crop conclusively tests higher than the acceptable hemp THC level via in-field and post-harvest sampling, but below 1.0 percent THC, CDA would issue an "Options Letter" to the producer that describes the nature of the failure, informs the producer that CDA will notify the USDA of non-compliant plant material, and guides the producer on how to dispose of their non-compliant crop. Test results above 1.0 percent would result in a negligent violation. Producers will be responsible for all post-harvest sampling costs.

Development of a Hemp Value Retention Program

If Federal laws permit, CDA should explore the feasibility of establishing a Hemp Value Retention program. The program could offer various options for farmers to sell their non-compliant plant material to licensed processors, which will allow them to retain more value in the crops that test conclusively above 0.3 percent THC at post-harvest, such as, but not limited to: (1) an industrial processing channel, where the mature stalks and seeds, or other plant material is used to produce non-consumable goods; and/or (2) a THC remediation channel, where THC is removed from hemp flowers during the extraction process and destroyed. Any hemp testing above 1.0 percent THC after post-harvest testing will require disposal.

Implementation

The following action items are needed to implement this recommendation. Items include:

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[10] Under the current regulations published by the USDA under the IFR, all plant material testing higher than 0.3 percent THC must be destroyed. Producers with plant material testing higher than 0.5 percent THC will also receive a "negligent violation". The policies contained in the recommendations do not include negligence at 0.5 percent, but at 1.0 percent, and are thus not compliant with current proposed Federal rules.

- Advocacy by Colorado leadership to approve disposal alternatives on a national level;
- New rules and definitions for post-harvest testing qualifications and implementation;
- Updated rules and definitions for allowable disposal methods and reporting requirements;
- New rules and definitions for hemp value retention program qualifications and implementation, when Federal law permits;
- New standard operating procedures for collecting, transporting, processing, and testing homogenized post-harvest hemp samples;
- Secure designation for CDA as a DEA Reverse Distributor to be eligible to conduct or oversee non-compliant plant material disposal;
- New standard operating procedures for collecting, transporting, recycling, and properly disposing of non-compliant plant material; and
- New standard operating procedures for qualifying, collecting, transporting, and processing hemp for THC remediation or for industrial processing, when Federal law permits.

Key Stakeholders

CDA, CDPHE, Colorado hemp cultivators, Tribal governments, processors[.]

8. Coordination of State and Local Regulatory Authority

Stakeholder Recommendation

Provide limited hemp registration information to other state and local government agencies, under a privacy restriction, to facilitate other jurisdictions' inspections, permit approvals, and enforcement actions. This generally applies to cultivation and processing/manufacturing sites within municipalities, unincorporated areas, or indoor cultivation facilities in cities or counties.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is 8 CCR 1203–23–2, which indicates that "any information provided to the Department may be . . . provided to (local) law enforcement agencies (for maintaining public order and enforcing the law)".

The purpose of coordinating state and local regulatory authority is to optimize resources, agency abilities, and regulatory experience to ensure that hemp production complies with all state requirements and local zoning and land use rules.

Regulatory Program

Current Program. CDA and CDPHE share limited information with Federal, Tribal, state, and local government agencies, including law enforcement agencies, as requested, or on an ongoing basis subject to privacy restrictions under a MOU. CDA and CDPHE have MOUs with several agencies in place already to facilitate other governmental permitting functions.

Recommended Enhancement. The need for collaboration between state and local government is necessary to ensure hemp producers comply with all state and local laws and requirements. While CDA and CDPHE regulate for production compliance, registrants are also subject to local government regulation for zoning, water use, public health and all other local laws as enforced by local law enforcement agencies.

Stakeholders recommended CDA and CDPHE develop a communication protocol with local governments and law enforcement, under a MOU, and assist localities to facilitate compliance with all local rules and regulations. Stakeholders also visioned the development of a hemp electronic traceability system (see recommendation 11). CDA and CDPHE will provide local governments and law enforcement with limited access specific to support local government regulatory functions, while maintaining compliance with all state and local confidentiality requirements. CDA and CDPHE should work with local governments through MOU to share necessary information.

Implementation

The following action items are needed to implement this recommendation:

- State and Local MOUs to coordinate information sharing;
- Local rule changes pertaining to the agencies responsible for establishing and enforcing local cultivation requirements; and
- Continued communication between the state and local agencies on compliance issues.

Key Stakeholders

CDA, CDPHE, Tribal, municipal and county governments, law enforcement agencies, Colorado hemp industry[.]

Testing Recommendations

9. Field Sampling and Sampling Agent Certification

Stakeholder Recommendation

The CDA Hemp Program should develop guidance on sampling hemp grown in Colorado for testing THC content according to USDA requirements, and establish a certification program to allow third parties to collect samples in the field for regulatory use.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is CRS § 35–61–104 and § 35–61–105. These statutes are specified for raw hemp sampling and testing in 8 CCR 1203–23–4 and should be further specified in rule during implementation.

The purpose of establishing a field sampling program is to: (1) comply with Federal regulations that require sampling of all hemp; and (2) to test hemp for THC content to ensure that crops meet the definition of industrial hemp according to CRS § 35–61–101.

Regulatory Program

Current Program. CDA has historically conducted random sampling across all registered lots each year to test for THC compliance. CDA anticipates they will increase sampling coverage from 25–30 percent of hemp lots to 100 percent to comply with the Federal rule. Beginning in 2021, CDA will develop and implement a third-party sampling certification program to allow private, certified sampling agents to collect samples and deliver them to certified labs. Recently, CDA has updated its Hemp Sampling Guidelines to materially align with sampling guidance from the USDA.

Recommended Enhancement. CDA should continue to conduct sampling with its own staff, consistent with its current practices and procedures, to ensure con-

tinuity of CDA's practice of accurate, efficient, and effective sampling. In addition, CDA should also implement the following certification program.

Third-party Sampling Program

Stakeholders recommended CDA develop a certification program for individuals and businesses to become official sampling agents. To acquire certification, an applicant would register with CDA and complete a certification training under CDA's Hemp Sampling Guidelines. The certification training would permit CDA to ensure that every certified sampler follows CDA's sampling guidelines when collecting hemp samples, including sample collection, transportation, and documentation. Third-party samplers will also receive training and be required to comply with special chain of custody procedures for the collection and transfer of hemp samples to eligible laboratories. The sampler certification program would be offered to qualified agricultural service providers or to other eligible and qualified entities and individuals.

Implementation

The following action items are needed to implement this recommendation:

- New field sampling standards and procedures that include post-harvest sampling for secondary testing
- New curriculum and administrative procedures for obtaining and maintaining certification as a field sampling agent

Key Stakeholders

CDA, Third-party field sampling agents, Colorado hemp cultivators[.]

10. Hemp Laboratory Certification Program

Stakeholder Recommendation

Develop a certification program that provides guidance to private analytical laboratories on certification requirements, appropriate analytical methods, and general testing procedures.

Basis & Purpose of Recommendation

The statutory basis for this recommendation lies in CRS § 35–61–105, § 35–61–105.5, § 25–1.5–101, § 25–1.5–104 and § 25–5–426. These statutes inform regulations for raw hemp testing in 8 CCR 1203–23–4 and should be further specified in rule during implementation.

Establishing a Hemp Testing Laboratory Certification Program would comply with the USDA rules to guarantee potency testing of all hemp lots grown in Colorado, and to protect public safety by ensuring consumable products meet standards for safety and purity. Further, Colorado should provide an initial testing framework for food and supplement products absent Federal guidelines from the FDA. Once a Federal framework is in place, the Colorado testing framework would be adjusted.

Testing information from certified labs is crucial for:

- Maintaining compliance with the USDA;
- Implementing an important part of the hemp electronic traceability system;
- Assuring potency and purity to consumers and businesses purchasing hemp products; and
- Protecting businesses and the public against inaccurate or misleading product claims, product impurities, and foodborne illnesses.

Regulatory Program

Current Program. The hemp and hemp products testing program includes a random hemp testing program administered by CDA and completed by the CDA laboratory. The CDA samples about 25 percent to 30 percent of hemp program registrants per year and tests hemp growing in the field for THC content. Testing for consumable hemp products is currently completed by CDPHE-certified labs. Hemp manufacturers selling consumable products must register with CDPHE to sell into the commercial food and supplement supply.

Recommended Enhancement. The new lab certification program would include the certification process, requirements for testing methods, and a framework for when testing is required by the state. The program is expected to be a minimum framework intended to supplement rigorous voluntary testing practices that will accompany products in most transactions. Key features of certified laboratory and testing program include:

Certifying process and criteria

CDPHE will serve as the certifying agency for labs that test consumable hemp and hemp products. CDPHE will adapt its process for certifying all other clinical, food, and environmental labs to hemp testing labs. At a minimum, CDPHE will inspect and certify labs to test hemp plant material and hemp products for:

- Cannabinoids (THC and other).
- Microbials;
- Residual solvents;
- Pesticides;
- Mycotoxins; and
- Heavy metals.

Each of the above would require a separate certification from the CDPHE. CDPHE certification requires that each laboratory obtain accreditation, including but not limited to ISO 17025, from an ILAC–MRA signatory accreditation body. The laboratory would then be required to apply and submit corporate and operational documentation and go through on-site inspection and auditing for approval. An annual fee would be required for certification.

CDPHE will require these documents at a minimum:

- Proof of ISO 17025 accreditation;
- An application that specifies which methods/analytes the lab is applying for certification;
- Organizational reporting structure;
- Acknowledgment that the laboratory will comply with policies established for all certified laboratories;
- Key staff qualification information; and
- Standard operating procedures and other essential laboratory documentation.

The CDPHE should incorporate all CDA and USDA requirements into the certification program. The USDA will require labs that test hemp to obtain a DEA certification. The program could offer two tiers of approval for hemp THC testing laboratories in Colorado:

- Certified Laboratories have met all specific state requirements, including ISO 17025 accreditation and registration with DEA, and
- Conditionally Certified Laboratories are ISO 17025 accredited and have met all CDPHE certification requirements but are not registered by the DEA.

Testing methods

All Colorado hemp testing labs must use analytical methods approved by CDPHE to ensure consistency of results across all laboratories. The CDPHE will consult rules established for other analytical labs, USDA, and FDA rules, as well as standards available from Association of Official Agricultural Chemists, American Society for Testing Materials (ASTM), the Association of Public Health Laboratories, and other relevant institutions.

Accepted methods may include gas chromatography, gas chromatography mass spectrometry, high-performance liquid chromatography, and other validated testing methodology. Official test results reportable to the USDA must provide the percentage of total THC content.[11]

Testing framework

All raw hemp is subject to mandatory field THC testing to enter the stream of commerce as required by the USDA. Field sampling will be conducted by the CDA and by CDA-certified sampling agents. For hemp entering the industrial supply chain, no further testing is required. For hemp destined for further processing for human or animal consumption, hemp products either need to be processed or manufactured in facilities that have their processes validated by CDPHE; or subject to a mandatory testing program that includes pathogens and microbials, pesticides, heavy metals, residual solvents, and cannabinoid content.

[11] Calculating total THC is achieved either using a post-decarboxylation analytical method (*i.e.,* gas chromatography) or by adding 87.7 percent of the THCA weight to the THC weight determined by a pre-decarboxylation (liquid chromatography) analytical method.

All state-mandated [12] testing of hemp and hemp products will be conducted by CDPHE-certified labs or the CDA. The CDPHE will require mandatory testing of production batches of all finished consumable products for ingestion and topical applications, for cannabinoid content, heavy metals, pesticides, microbials, mycotoxins and residual solvents. Processing and manufacturing registrants that opt to have their processes validated [13] through consistent purity and potency tests can reduce or bypass potency and contaminant testing of every production batch. Process validation is obtained through submitting information to CDPHE on procedures and passing multiple consecutive contaminant and potency tests within a specified period. Renewal and re-inspection are required upon a process change or according to CDPHE recommended interval.[14] All testing expenses are the responsibility of the business selling hemp or hemp products.

Disposal protocol

Compliant hemp samples do not need any special disposal procedures. If necessary, certified labs should comply with DEA and/or state guidelines for marijuana disposal, *i.e.,* excess samples that test above 0.3 percent THC is only disposed of after being "rendered unrecognizable" by mixing with dirt, compost, or similar material. Excess sample that tests below 0.3 percent THC may be disposed of as is. Hazardous waste created during cultivation, laboratory testing, and the manufacturing process will need to be disposed of per Federal, state, and local laws, regulations, rules, and/or other requirements.

Implementation

[12] Most market participants exchanging product require a certificate of analysis that provides information on intermediate product potency, purity, and the presence of contaminants (if any). For general or R&D purposes, use of CDPHE-certified labs is not required.

[13] CDPHE process validation for hemp will be the same for other food and supplement manufacturers. It is modeled after FDA process validation guidelines and unique to each facility and process introduced. Each applicant must present its procedures and certifications to CDPHE, which inspects, approves, and re-inspects on risk-based parameters. Companies with detailed safety plans in place, such as a HACCP or CAPA plan, and with an audit for compliance with cGMP standards are viewed favorably in the CDPHE assessment.

[14] CDPHE renews either bi-annually, annually, semi-annually, or quarterly based on risk profile.

The following action items are needed to implement this recommendation. Items include:

- Obtain statutory authority to promulgate rules related to certification of hemp labs (CDPHE)
- Adopt rules for certification requirements, testing framework, based on existing programs (CDPHE)
- Adopt rules for accepted lab procedures and inspections, based on existing programs (CDPHE)
- Obtain statutory authority to collect inspection fees; to direct where the funding goes; and to and periodically adjust fee collection and disbursement procedure (CDPHE)
- Implement lab certification program, inspection procedures and system to verify field testing and finished product testing

Key Stakeholders

CDPHE, CDA, Analytical labs, Colorado hemp cultivators and processors[.]

Transportation Recommendations

11. Electronic Traceability System

Stakeholder Recommendation

Implement an Electronic Traceability System (ETS) to support an uninterrupted chain of custody for hemp products from harvest to commercial sale and to provide secure and verifiable information to various stakeholders.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is the 2018 Farm Bill Section 12619 and Colorado Senate Bill 17–090.

The purpose of an ETS would be to collect information throughout the hemp supply chain that can be accessed and reviewed in a single application by multiple stakeholders. The ETS would create a standardized electronic database system for all required documentation such as the manifest for verification while transporting hemp; a confirmation of laboratory testing of products; and a transaction history.

Stakeholders envisioned the ETS would allow for the coordination among the many agencies that regulate hemp and intrastate and interstate commerce including but not limited to; CDOT, CDA, CDPHE, The Office of the Governor, The Office of the Attorney General, Colorado State Patrol, and local and Tribal governments. The ETS will interface with databases across all involved industry businesses and agencies to create a secure and verifiable ledger for tracing hemp across the supply chain and protect the integrity of the hemp industry. It is important to note that stakeholders felt that since hemp is a legal commodity the ETS should not be used to provide unnecessary over-regulation. Rather, the ETS should utilize an appropriate block-chain technology to help the industry comply with existing regulations and provide verifiable importation of the products related to compliance and quality standards.

Key users such as producers, processors, law enforcement, and government officials could use the system for a variety of purposes including, but not limited to:

- Providing hemp transporters and law enforcement a tool for real-time verification of the legality of a shipment;
- Providing banking and insurance sectors with data that allows verification of a licensed hemp grower or an ancillary business in good standing;
- Supplying compliance information, such as passed or failed, at all stages of production such as cultivation and manufacturing;
- Verifying certifications such as using certified seed or organic designation;
- Distributing information accessible to all relevant agencies including names and contact information of parties in the chain of custody; and
- Allowing consumers the ability to confirm the source of the products they are purchasing as originating within the Colorado regulated hemp system.

Regulatory Program

Current Program. There is no current ETS in Colorado for hemp. The state registration system and detailed product documentation, including manifests and certificates of analysis, are used to determine product authenticity.

Recommended Enhancement.

Intrastate transport

The creation of a new communication protocol through an ETS for tracking hemp could be modeled on existing protocols for the shipment of agricultural and non-hazardous manufactured products. CDA and CDPHE should have the final say in the provision of documents for product verification.

Required documents will likely follow those outlined for the protocol, but the standardized protocol should be expanded to provide enhanced communication and tracking across the hemp supply chain. For this to occur, the selection and development of a single platform will be essential. The following should be considered in developing the protocol:

- A process for verification when in remote areas without reliable internet access;
- Standardization anti-tampering requirements;
- Flexibility for the future implementation of distributed ledgers and associated technologies for enhanced traceability and fraud protection;
- Use of batch level tracking (not per plant) will be imperative for recall and verification purposes; and
- Creation of training materials on the protocol.

The ETS will allow any user to distinguish whether hemp or hemp products encountered in the field, in facilities, or in transit can be verified as hemp and can be traced to its origin. Without reliable and affordable mobile testing procedures, it is impossible to distinguish legal hemp from legal or illegal marijuana. In place of physically testing the product a standardized protocol, along with education, will reduce the risk of costly miscommunications.

Interstate transport

Additional documents may be required when transporting across state borders and the electronic system must provide flexibility for this. Colorado will comply with all Federal documentation requirements for interstate hemp shipments. Interstate communication and coordination will be essential for the success of the Colorado hemp industry. Colorado should share the lessons learned from developing its intrastate communication protocol with other states, and work to build partnerships with other states and the USDA in developing a nationwide traceability system and serve as a leader absent Federal guidelines.

System development

The ETS should be developed through an interagency workgroup to ensure buy-in and input from relevant agencies. It is recommended that this task force include representatives from the Office of the Colorado Attorney General, Colorado State Patrol, CDA, CDPHE, Office of Information Technology, Colorado Bureau of Investigation, a local government, Tribal government and industry.

The duties of the task force should be to:

- Develop requirements for the protocol;
- Secure funding;
- Select the company to develop the system through a competitive request for proposal process;
- Determine required documents;
- Specify the interstate interface;
- Establish protocol for questions and verification process for the documents;

- Monitor implementation of new protocol and needed adaptations;
- Select the agency(s) responsible for the ongoing management of the system and facilitate the transition from the task force; and
- Appoint a liaison from the State of Colorado to coordinate with other states this person should work alongside the tracking systems contracted vendors to help other states develop their own tracking systems.

Implementation

The following action items are needed to implement this recommendation:

- Collaboration with the Hemp Advisory Committee and the hemp industry to confirm the direction and implementation of a tracking system is appropriate;
- Development of a taskforce among key stakeholders to evaluate options and develop implementation plan;
- Legislation to establish the creation of an ETS; a protocol to provide information to legitimate users and to protect data confidentiality of participants; and
- Creation of a funding mechanism for agency or task force to develop technical specifications and solicitation process to develop and implement the electronic tracking system.

Key Stakeholders

CDA, CDPHE, Tribal and local governments, Colorado hemp cultivators and manufacturers, transportation industry, law enforcement[.]

12. Transportation Protocol

Stakeholder Recommendation

Develop guidance and best practices for transporting hemp and hemp products within Colorado including proper documentation and recordkeeping.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is CRS § 35–61–108(3), which states that CDA "may promulgate rules to require approved shipping documentation for the transportation of hemp."

The purpose of the establishment of a protocol and industry best practices for the transportation of hemp is to develop a clear set of rules around the intrastate and interstate transportation of hemp and transportation across Tribal and international boundaries. The creation of guidance will build on existing CDA rules and regulations and establish standards around the appropriate documentation, communication procedures, best practices and training protocols surrounding the transportation of hemp in Colorado.

Regulatory Program

Current Program. Transporters currently carry a manifest and a Certificate of Analysis (COA), but local law enforcement often is unclear how to verify the shipments. A successful Colorado hemp industry requires standardization of processes and documentation. Developing a coordinated protocol will take time. It is recommended that in the intermediate time frame transporters should have the fol-

lowing documents on-hand so that law enforcement can verify by the issuing agencies if needed:

- Travel Manifest;
- COA matching travel manifest;
- CDA Registration Number;
- Manufactured Food or Storage Facility Registration Number; and
- Commodity Handler or Farm Producer Dealer License from CDA (if applicable).

Recommended Enhancement. Develop guidance and best practices for the transportation of hemp and hemp products utilizing existing CDA rules. Due to the nature of hemp, specific protocols will need to be developed with input from numerous state agencies and hemp businesses.

The regulatory protocol will develop the following standards:

- Required transportation documentation;
- Rules for the storage, packing and transportation of hemp;
- Development of interstate compacts;
- A unified communication protocol;
- Insurance company documentation to insure hemp loads and bond drivers;
- Protocol for the transportation of hemp products (such as intermediate products or products bound for destruction) that are over 0.3 percent THC, as allowed in Federal rule; and
- Protocol and procedure for a coordinated response by state law enforcement regulatory authorities.

Transportation best practices

The CHAMP process identified these best practices to include in the transportation regulatory protocol:

- Ensure shipping documents are fraud-resistant and display information such as the CDA or CDPHE registration numbers;
- Provide guidance on paper and digital records and ensure that the records match;
- Communication from all involved government agencies and local law enforcement;
- Require adherence to all state and local regulations, including storage and odor control;
- Develop a database of all key law enforcement and regulatory authorities available for contact.

Interstate considerations

One of the key aspects of the transportation protocol will be the creation of interstate compacts which should include:

- Development of a reciprocity agreement for states and Tribal governments that states approved hemp and hemp products in one state will be recognized in all;
- Development of an agreement on a common set of shipping documentation to verify compliance with hemp regulations in the state of origin;
- Agreement on hemp tracing systems to assist law enforcement;
- Protocol for third-party entities transporting hemp;
- Interstate weighing requirements; and
- Appointment of a liaison to serve as the key contact for coordination with other states.

Implementation

The following action items are needed to implement this recommendation:

- Develop transportation rules and requirements for documentation, including rules to transport intermediate products;
- Develop interstate compacts for hemp transport as needed;
- CDA, CDPHE, and Tribal governments should each focus on education and outreach to:
    - Assist the state in developing rules and standards for transporting hemp and hemp products;

- Educate industry practitioners and law enforcement about hemp documentation and labeling requirements;
- Evaluate the need for requirements to maintain registrations and for the creation of a 'fit for commerce' certification program for transporters and producers; and

- Secure appropriation and allocation of funds to develop and implement protocols.

Key Stakeholders

CDA, CDPHE, Tribal and local governments, Colorado hemp cultivators and manufacturers, transportation industry, law enforcement[.]

Processing Recommendations

13. Processor Registration and Inspection

Stakeholder Recommendation

Continue the integration of hemp into the CDPHE food and dietary supplement processor and manufacturer program. Further define licensed activities as needed and provide a means for the state to register and regulate hemp processors and manufacturers in Colorado. This is an existing, active program.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is CRS § 35–61–108, § 35–1–104, § 25–1.5–104, § 25–4–1603, and § 25–5–426. These statutes authorize CDA and CDPHE to regulate and inspect food processing facilities generally and hemp processing facilities specifically. These statutes are further specified in 6 CCR 1010–2 and 1010–21 Colorado Retail and Wholesale Food Regulations.

Maintaining a proper processing licensing system for hemp products is necessary to protect public safety and to ensure that only properly trained and supervised professionals using current good manufacturing practices create products that enter the commercial food, dietary supplement, and cosmetic supply chain. A licensing system ensures safety and accountability in processing procedures for ingredients and products that ultimately end up as food, dietary supplements, or industrial products.

Regulatory Program

Existing Program.

Hemp Processor Definition

Licensed hemp processors fall into three categories depending on their processing methods and intended market. A key distinction in processor licensing and regulation is whether the processor produces products intended for human consumption through topical, ingestible, or inhalable delivery methods:

- *Industrial processor.* Industrial processors use raw hemp inputs to make intermediate and final industrial products out of hemp bast, fiber, cellulose, hurd, and lignin. These materials are processed to make fuel, textiles, paper, plastics, building materials, and other industrial products.
- *Extraction and post-processing (consumable).* Hemp extractors and post-processors use a variety of chemical and mechanical processes to extract and separate cannabinoids, terpenes, flavinoids, and other compounds from plant fibers and waxes. CDPHE is the lead state agency for licensing and regulating hemp extractors and post-processors. Hemp extractors and post-processors must follow all state and local laws and regulations, including local fire, building, and zoning codes.
- *Finished products (consumable).* Finished products registrants include all processors that manufacture hemp products for sale to retailers and directly to consumers. CDPHE licenses and regulates Colorado food and supplement manufacturers and maintains a list of all registrants. This list includes hemp finished product manufacturers. CDPHE inspects these operations under 6 CCR 1010–21 to ensure compliance with product and process standards. Local governments inspect facilities for conformance with local fire, building, and zoning codes and ordinances. All hemp finished products are subject to safety and potency testing according to CDPHE rule (6 CCR 1010–21).

State and Local Authority

A combination of state and local governments regulates hemp processors. CDPHE regulates consumables processors for safety and technical procedures. CDA regulates farm processors for safety. All processing facilities are subject to local government regulation for zoning, fire safety and public health, and all local laws as enforced by local law enforcement agencies. CDA and CDPHE provide hemp registration information under MOU to local governments and law enforcement and have developed a communication protocol to facilitate local enforcement and regulatory activities.

Licensing and Inspection

Licensing and inspections are already completed by CDPHE and local governments for consumable product processors. CDPHE already requires new applicants to submit documentation of occupancy permits which includes local government regulatory compliance. CDPHE uses procedural guidelines for food production in accordance with Federal regulations and has incorporated the use of hemp as an ingredient in food processing. Consumable processors are expected to follow all local, state, and Federal guidelines for safe and sanitary food production. License and inspection fees are required for local occupancy permits and by CDPHE. Facility inspections occur at the discretion of CDPHE and local government agencies, usually at the time of license, certificate of occupancy issuance, upon renewal, as part of a corrective action plan, or at random.

Industrial processors do not require a specific state license, other than compliance with all state and local safety regulations, and ordinances to obtain a local occupancy permit.

Implementation

Colorado state and local governments already have procedures and programs in place to regulate hemp processors or to integrate hemp into existing regulatory programs. The following action items are needed to implement this recommendation:

- Harmonize registration, statute, and regulation with definitions of terms and types of processors above;
- Develop (or renew as needed) MOU for information sharing with local governments and law enforcement; and
- Consult with ISO, ASTM, NSF, U.S. Hemp Authority (USHA), American Herbal Products Association (AHPA), and other groups developing hemp-specific processing standards.

Key Stakeholders

CDPHE, CDA, Colorado hemp processors, national processor certifying agencies[.]

14. Processor and Manufacturer Standards

Stakeholder Recommendation

Clarify and develop state regulatory requirements for processing and manufacturing practices related to hemp products. Current Good Manufacturing Practice (cGMP) should be administered through the CDPHE Manufactured Food Program. This program is largely an existing program in CDPHE with some specific adaptations for hemp products.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is CRS § 25–5–426. This statute authorizes CDPHE to promulgate standards for food and other consumable products made by hemp processing and manufacturing operations. These statutes are further specified in 6 CCR 1010–2 and 1010–21 Colorado Retail and Wholesale Food Regulations.

CDPHE is the state licensing, certification, and food protection agency. The department is tasked with establishing minimum standards and rules for wholesale and retail food establishments to protect public health and safety. Hemp and hemp extracts are processed into food, dietary supplements, cosmetics, and other consumable products and come under CDPHE regulatory authority. CDPHE requirements for processing and manufacturing standards ensure that products are unadulterated and safe for consumption. Hemp and hemp products are already integrated into CDPHE programs for wholesale and retail food, which also includes dietary supplements. CDA provides regulatory oversight for products for animal consumption.

Regulatory Program

Existing Program. CDPHE incorporates by reference into its regulations the majority of the Code of Federal Regulations for food and dietary supplements established under the authority of the FDA.

cGMP regulations require a quality approach to manufacturing, enabling companies to minimize or eliminate instances of contamination and errors. This protects the consumer from purchasing a product that is not effective or potentially dangerous. CDPHE verifies compliance with cGMP through random inspections and through the licensing process by review of operating procedures, acceptance of 3rd party verification, and initial inspection.

Consumable Food, Dietary Supplements, and Cosmetics

All hemp processors and manufacturers defined as producing cosmetics and consumable products should follow the adopted regulations modeled after standards set by appropriate regulatory authorities, including CDPHE and FDA, and industry standards organizations such as ASTM, AHPA, Organic & Natural Health Association, NSF, and ISO. These rules include the existing CDPHE rules for wholesale and retail food producers cited above and these Federal rules, included in CDPHE rule by reference or CDA authority:

- FDA cGMP for:
  - Food (and 21 CFR 117)
  - Dietary supplements (21 CFR 111)
  - Animal products (21 CFR 507)
- The U.S. Food, Drug, and Cosmetics Act, and the Fair Packaging and Labeling Program, for cosmetics and topicals (21 U.S.C. § 361–363, 15 U.S.C. § 1451–1461).

The above Federal and state regulations address issues including recordkeeping, personnel qualifications, sanitation, cleanliness, equipment verification, process validation, and complaint handling, and generally allow each manufacturer to decide individually how to best implement the necessary controls in their business. In developing additional hemp-specific rules, CDPHE shall consider the inclusion of both a hazard analysis and critical control point (HACCP) assessment; and corrective action—preventive action systems (CAPA, required), which identify, evaluate, and control for safety hazards and pathogens in production facilities. These plans require batch coding, contaminant controls, pathogen mitigation and other preventive and corrective measures.

Inhalable Products

There are no state guidelines for hemp products sold for inhalation, including smokable hemp flower and oils intended for vaporization and inhalation. A statutory change will need to be initiated to provide CDPHE or another state agency the authority to adopt cGMP for these products to ensure purity and consumer safety to the greatest extent possible. For smokable flower, CDPHE could examine FDA tobacco rules (21 CFR 1140) or potentially the Colorado MED marijuana rules (1 CCR 212–3) for information on purity and safety requirements if deemed applicable. Similarly, for vaporized oils, CDPHE can refer to the FDA rules for dietary supplements (21 CFR 111) and to MED marijuana rules for infused concentrate products (1 CCR 212–3 Rule 3–335) if deemed applicable. Producers of these products are subject to CDPHE licensing and testing protocols.

Process Validation and Testing

CDPHE should incorporate hemp processors and manufacturers into existing process validation practices for food and supplement producers. Considerations should be made in the regulations that registrants that opt to have their processes validated may reduce or bypass potency and contaminant testing of every production batch. Process validation should be renewed upon a process change or other approved interval [15] and is obtained through passing multiple consecutive contaminant and potency tests within a specified period.

Implementation

Colorado state and local governments already have procedures and programs in place to regulate hemp processors and manufacturers. The following action items are needed to implement this recommendation.

- Legislation to extend CDPHE regulatory authority to hemp products and for proper hemp integration as needed;
- Consult with FDA, other states, and other groups developing hemp-specific processing and manufacturing standards; and
- Develop education program for CDPHE to hold sessions for new and existing manufacturers for how to comply with cGMP (and other) hemp regulations.

Key Stakeholders

CDPHE, Colorado hemp processors, national processor certifying agencies[.]

Manufacturing Recommendations

15. Manufacturer Registration and Inspection

Stakeholder Recommendation

Continue the integration of hemp into the food and dietary supplement manufacturer program. Further, define licensed activities as needed and provide a means for the state to register and regulate hemp processors and manufacturers in Colorado. This is an existing, active program.

Basis & Purpose of Recommendation

The statutory basis for this recommendation is HB 18–1295 which established that hemp food and cosmetic products shall be treated like other similar product types. Other relevant Federal statutes:

- Food (21 CFR 110 and 21 CFR 117)
- Dietary supplements (21 CFR 111)
- Animal products (21 CFR 507)

The infrastructure for the creation of registration procedures for hemp manufacturers is already in place with the food manufacturing registration procedures of the CDPHE, but slight modifications will be needed, including the development of a hemp-specific registration form.

Regulatory Program

Existing Program.

Hemp Manufacturer Definition

[15] Most renewal intervals are either biannual, annual, or quarterly, although specific to each facility and process.

A hemp manufacturer is defined as an industrial hemp processor or producer making hemp-derived products and is divided into two subtypes:

- *Consumable Manufacturer.* An industrial hemp manufacturer making hemp-derived products intended for human use or consumption, either as a finished good or as an ingredient/component of a finished good. This definition includes (but is not limited to) foods, beverages, tinctures, topicals, and transdermals. Inhaled products and suppositories are not covered under the registration program, a legislative change would be required for their inclusion.
- *Industrial Manufacturer.* An industrial hemp manufacturer making industrial hemp products (including but not limited to textiles, construction materials, fibers, animal/pet feed or treats) not intended for human use or consumption.

Registration Procedure

Registration of hemp manufacturers is already occurring and builds on the already existing protocols set out by the CDPHE for all food and dietary supplement manufacturers. CDPHE already has a procedure for registering manufacturers and consumable hemp product manufacturers that can fall under this existing registration process. CDPHE also has existing packaging and labeling requirements in place that can be adapted to hemp.

Considerations for potential modifications of existing procedures for hemp manufacturing regulation:

- Procedures for regulating waste processors, the potential need for registration with CDA.
- Determination on whether additional oversight of non-consumable industrial hemp manufacturers is needed, and the appropriate state and/or local government agencies to lead.
- More review and discussion to determine if there is a need to include cosmetics and topicals in the consumables procedure (currently exempt from the CDPHE procedure).

- More review and discussion to determine the procedure for vaping (currently exempt from the CDPHE procedure).
- Adherence to all local jurisdiction and Tribal authority requirements will be necessary for license approval.

- Consideration of options to utilize non-compliant hemp products (but not for human consumption).

Non-consumable Industrial Manufacturers

CHAMP stakeholders determined more discussion is needed to determine whether there is the need for additional regulatory oversight for non-consumable industrial hemp production and manufacturing, and the appropriate state agency if needed. Local and Tribal jurisdictions will continue to be involved in health inspections, business licenses, building permits, occupancy, and zoning regulations. CDPHE is the lead state regulatory agency for manufacturing consumable hemp products in Colorado.

Implementation

The following action items are needed to implement this recommendation:

- Continue to integrate hemp manufacturers in CDPHE licensing, inspection, and regulatory rules—legislation will be needed to provide CDPHE with the authority to regulate inhalable products;
- Clarify the point in the hemp supply chain where regulatory authority over industrial hemp is transferred to the CDPHE when hemp-related products are intended for human consumption;
- Clarify whether there is additional regulatory oversight required of non-consumable industrial hemp[.]

Key Stakeholders

CDPHE, CDA, Colorado hemp manufacturers, national manufacturer certifying agencies[.]

Marketing Recommendations

16. Glossary of Terms

Stakeholder Recommendation

Provide a list of terms and definitions for different stages in the supply chain to create a universal understanding of the hemp industry terminology.

Basis & Purpose of Recommendation

Every profession, industry, or sector has technical nomenclature. The hemp industry is no exception to this principle and uses many terms that may be misconstrued or confusing to people not directly involved in the sector. This has implications for communications, transparency, and information flows across the supply chain, where buyers, sellers, and consumers must know what they are purchasing and using.

Given the nascent status of the industry, Stakeholders suggested that a glossary of terms would be useful as a starting point to standardize how products are defined along the supply chain.

Glossary by Stage in Supply Chain

Disclaimer. The following are conceptual definitions that were developed by participants during meetings in the R&D and seed, cultivation, testing, processing, manufacturing, and marketing stakeholder groups. Official Federal, state, and local regulatory terms may differ from the definitions contained herein.

Stakeholders should ultimately rely on Federal definitions of hemp and marijuana, and on definitions published in the Colorado Revised Statutes or Code of Colorado Regulations for reference.

State agencies should strive to adopt standardized definitions when developing official regulatory definitions, and the following can provide a basis.

Biology and Chemistry of Plant Compounds

- **Bioavailability**—This term refers to the degree and rate at which a drug is absorbed by the body's circulatory system. It's an important measurement tool because it determines the correct dosage for drugs, supplements, and herbs administered non-intravenously, such as through consumption, inhalation, or topical application. Bioavailability measurements denote the fraction of the ingested dose that gets absorbed by the body.

- **Cannabinoid(s)**—(also "phytocannabinoid(s)") A group of compounds that can be found in cannabis, other food-producing plants, and in the human endocannabinoid system. There are many different cannabinoids, and they are often written in their abbreviated form.[16] Below is a (non-exhaustive) list of cannabinoids.
  - Delta-9 Tetrahydrocannabinol (Abbrev: THC): THC is the primary psychoactive compound in cannabis
  - Cannabidiol (Abbrev: CBD) CBD is valued for several medical properties and is non-psychoactive
  - Cannabinol (Abbrev: CBN)
  - Cannabigerol (Abbrev: CBG)
  - Cannabichromene (Abbrev: CBC)
  - Cannabicyclol (Abbrev: CBL)
  - Cannabivarin (Abbrev: CBV)
  - Cannabielsoin (Abbrev: CBE)
  - Cannabicitran (Abbrev: CBT)
  - Tetrahydrocannabivarin (Abbrev: THCV)
- **CB1/CB2 Receptors**—The CB1 and CB2 receptors are endocannabinoid receptors found in the human body that are responsible for interacting with different cannabinoids. CBD and THC often interact directly with these receptors.
- **Decarboxylation/Decarb**—Decarboxylation is a chemical process that relies on heat (often from combustion or cooking) to eliminate a carboxylic acid group from the cannabinoid. Decarboxylation is how the acid forms of cannabinoids are converted into their non-acid forms. For example, THCA is converted to THC by decarboxylation.
- **Delta-9 tetrahydrocannabinol (THC)**—This is the primary cannabinoid responsible for psychoactive effects. It interacts with endocannabinoid receptors in the brain to release dopamine.

[16] Note: Every cannabinoid has an "acid" precursor form. These acid precursors are produced by the plant and are converted into their non-acid form in a process known as decarboxylation, which we will describe later. Acid precursors have their abbreviation appended with an "-A" or "A." (*i.e.:* THCA/THC-A, CBDA/CBD-A)

- **Endocannabinoid System**—The endocannabinoid system is a signaling system responsible for regulating a variety of hormones and chemical signals. In humans and most animals, constituents of cannabis act upon the endocannabinoid system and may affect some functions of the body and/or how sensations such as pain are experienced.
- **Industrial Hemp—Federal Definition**[17]—(also "hemp") Is the plant *Cannabis sativa* L. and any part of that plant, including the seeds thereof and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a delta-9 tetrahydrocannabinol (THC) concentration of not more than 3/10 of one percent (0.3%) on a dry weight basis.
- **Marijuana—Federal Definition**[18]—All parts of the plant *Cannabis sativa* L., whether growing or not; the seeds thereof; the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin. Marijuana does not include—hemp, as defined above; or the mature stalks of *Cannabis sativa* L., fiber produced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of such plant which is incapable of germination.
- **Terpene(s)**—Terpenes occur naturally in many plant families and create the wide variety of smells and flavors associated with cannabis and other botanicals.

Seed Testing and Certification

- **Certified seed**—Certified seed designation validates a variety's genetic purity, weed absence, uniformity for harvest, and yield standards for each crop. The seed certification process includes specific varietal review, testing and labeling procedures.
- **THC verification**—A CDA-approved trial process (separate from AOSCA certification) that occurs alongside the seed certification process to test THC level in mature hemp plants entered for seed certification. This process will be harmonized with AOSCA once there are international standards for THC verification.
- **Feminized seed**—Feminized seeds are seeds with a very high likelihood to produce female hemp plants. Feminized seeds are specially bred or separated from male seeds using genetic testing. Cannabis as a plant is dioecious, which means plants can be male, female, or a hermaphrodite (showing traits of both sexes). Female plants are most desirable for cannabinoid and oilseed production. Feminized seeds are made by essentially crossing one female with another. Breeders use techniques to force female plants to produce "female" pollen. They then fertilize another female; whose flowers produce a generation of feminized seeds.
- **Certified clone program**—A genetic certification program for plants used for cloning, similar to seed certification. Under a certified clone program, plants enter a varietal review and are grown full term, in multiple conditions over multiple seasons to verify identity, purity and select traits. Definitions for foundation, registered and certified genetic stock will be developed by CSGA.
- **Open source hemp genetics**—Any seed or clone used for breeding, produced by the plant *Cannabis sativa* L. that possesses a THC content less than or equal to 0.3 percent tested according to CDA regulations; and is not patented, certified or otherwise protected.

Plant and Cultivation Terminology

- **Aeroponics**—A hydroponic cultivation method where the plant's roots are suspended in air and sprayed regularly with a fine mist of nutrient solution. Unlike other hydroponic methods, aeroponically grown plants do not have their roots suspended in water.
- **Bud/Nugget/Flower**—Terms that refer to the flower of female cannabis plants. Unlike other flowering plants, cannabis flowers are dense and concentrated.
- **Dry weight**—The weight of plant material with no greater than 13 percent moisture content.

[17] 7 U.S.C. § 1639o(1).
[18] 21 U.S.C. § 802(16).

- **Flowering**—A late stage in the life cycle of cannabis where buds become dense, trichomes appear with greater frequency, and the cannabis plant prepares for reproduction. After flowering, cannabis plants will die.
- **Hydroponics**—A growing method that does not rely upon traditional soil. Plants can be grown in a variety of media and fed nutrients dissolved in water using different methods, including ebb-and-flow, aeroponics, and deep-water culture.
- **Integrated Pest Management**—A pest control strategy that focuses on preventive and proactive techniques, rather than reactive pest control.
- **Medium**—A substance in which plants are rooted if not in soil in the ground. This can be traditional soil, coco coir, rockwool, clay, sand, pebbles, or other material.
- **Mother Plants**—Also known as stock plants, cannabis plants kept permanently in a vegetative state for growers to take cuttings or clones from them. Mother plants serve as the genetic basis for clones in a growing facility.
- **Propagation**—Early plant life cycle phase in which plants are cloned or grown from seed. This is the most delicate phase of growth.
- **Vegetative State**—The period in-between propagation and flowering. It is a period where the cannabis plants have a sturdy root system and focus photosynthetic energy on growth.

Processing and Manufacturing

- **Acceptable Potency Level**—A hemp crop or product with a delta-9 THC concentration of 0.3 percent or less by weight.
- **Broad Spectrum Extract/Product**—Extracts and products from hemp which contain multiple cannabinoids but have THC effectively removed. Broad spectrum products have a non-detectable level of THC & have detectable levels of other cannabinoids & terpenes.
- **CBD Isolate**—The purest form of CBD, which is produced by removing all other compounds found in the plant including, terpenes, flavonoids, plant parts, and other cannabinoids. CBD isolate comes in a granular or powder form and is odorless and tasteless. The end-product contains no (or nondetectable) levels of THC or other compounds. No specific identity threshold currently exists to define purity required to use the term 'isolate'.
- **CO_2 extraction**—The carbon dioxide extraction process uses changes in temperature and pressure to create phase changes in carbon dioxide, gently drawing out the plant's beneficial components. The result is clean, pure oil with a long shelf life.
- **Concentrates/Distillates/Extracts/Isolates**—These terms describe compounds made by extraction, concentration, distillation, and isolation processes that separate compounds that are recognized as useful and beneficial from other plant compounds.
- **Ethanol extraction**—Extraction using cold or hot, high-grade alcohol that detaches all the active compounds from the cannabis plant's cellulose material, resulting in pure, full spectrum hemp oil. Oils extracted using this method are further refined via centrifugal chromatography to remove all remaining traces of ethanol.
- **Full Spectrum Extract/Product**—Extracts and products from hemp that contain the full cannabinoid profile and all other compounds including terpenes, flavonoids, proteins, phenols, sterols, and esters, naturally occurring in the cultivar from which it was produced.
- **Non-detectable THC**—Term used to describe a hemp product, usually a broad-spectrum product, with THC removed and reduced to levels undetectable by common testing methods. A specific detection threshold needs to be established. This term can be used on any hemp product with THC removed.
- **Potency**—A measure of drug activity expressed in terms of the amount required to produce an effect of given intensity in the body. A high-potency drug evokes a larger response even at a low dose, while a low-potency drug evokes a small response at low concentrations and requires higher doses for a similar effect.
- **THC Free Extract/Product**—An intermediary or final product that when tested, shows no or a non-detectable level of THC. This term should only describe cannabinoid (usually CBD) isolate or isolate products. Lab results must show the presence of terpenes, CBD, & other minor cannabinoids. A specific detection

threshold definition needs to be established to determine a product as free of THC.

- **Whole Plant Extract/Product**—This is a term used for extract or products using the entire plant, stems, leaves, roots, and flowers in the extraction process, and is also commonly called a botanical extraction. Full spectrum is implied if a product is a whole plant extract. The product retains the terpenes, cannabinoids, vitamins, minerals, fatty acids, phytonutrients, and any other materials naturally occurring in the cultivar from which it was produced.

Figure 9. Primary Hemp Crops: Fiber, Seeds, and Flowers

Characteristic	Fiber	Seed/Grains	Flower/Cannabinoids
Desired Plant Material	Stalks (bast fibers and hurd/core fibers)	Dried (high in oil and protein)	Dried and cut (flower bud and floral material)
Planting Density	Dense spacing to discourage branching and flowering (35–50 plants/ft^2)	Dense spacing to discourage branching and flowering (35–50 plants/ft^2)	Well-spaced (typically planted 3–4′ apart on a 3–5′ center)
Physical Characteristics	Tall plants with small stalks and less leafy material	Plants with small stalks and less leafy material	Bushy plant with wide branching to promote flowers/buds (selecting female plants is ideal)
Harvest Height	10–15′	6–9′	4–8′
Harvesting Considerations	Typically using hay equipment (mow, field retting 2–3 weeks, then roll balling)	Must be harvested within a short window due to seed scatter issues	Harvesting is highly labor intensive, in part given possible degradation of plant material related to efforts to preserve the chemical properties of the plant's flowering heads; also requires drying down to ten percent moisture

Source: Congressional Research Service: *https://fas.org/sgp/crs/misc/R44742.pdf.*

Regulated Marketing Claims and Medicinal Foods

- **Regulated Marketing Claim**—There are four major categories of marketing claims regulated by the Federal Government (FDA and FTC) including:
  - *Authorized Health Claim.* Food ingredients for which there is significant scientific agreement on specific health benefits may receive formal approval from the FDA to make claims that consuming a certain amount of the ingredient may improve certain health conditions (such as eating rolled oats to reduce heart disease).[19]
  - *Drug Claim.* Any product that claims to diagnose, prevent, mitigate, treat, or cure a disease is a drug. Typically, any mention of a disease on labels or marketing materials (print or digital) triggers the product's status as a drug. Drugs must be approved by the FDA prior to being marketed.[20]
  - *Health Benefit Claim.* The Federal standard for making a health benefit claim requires the marketer to have "competent and reliable scientific evidence" produced by "qualified professionals" using "procedures generally accepted in the profession to yield accurate and reliable results."[21]
  - *Structure/Function Claims.* Structure and function claims may describe the role of a nutrient or dietary ingredient intended to affect the normal structure or function of the human body, for example, "calcium builds strong bones." In addition, these claims may characterize the means by which a nutrient or dietary ingredient acts to maintain such structure or function, *e.g.,* "fiber maintains bowel regularity," or "antioxidants maintain cell integrity."[22]
- **Medicinal Foods**—There are two types of medicinal foods regulated by the FDA including:
  - *Functional Foods and Nutraceuticals.* These terms are used often in the marketplace, but there is no statutory definition. The FDA regulates functional foods (*e.g.,* oatmeal) and nutraceuticals (*e.g.,* milk with added vitamin D) like any other food: if it contains a drug ingredient, makes a disease claim, or

[19] There are only a handful of Authorized Health Claims for food ingredients with health benefits. Many of these claims required extensive clinical trials and lawsuits to secure. FDA Guidance[.]

[20] Drug approvals and claims require FDA approval, extensive research, clinical trials, and safety reviews.

[21] See further FTC guidance.

[22] See further FDA structure/function claims guidance.

makes a health benefit claim without proper substantiation, the agency will act accordingly.[23]

- *Medical Foods.* A food which is formulated to be consumed or administered enterally under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles, are established by medical evaluation.[24] Medical foods must be administered under the supervision of a physician.

End-User and Retail

- **Edibles**—Edibles are a large variety of different foods created using cannabis concentrates including infused sugar, infused oil, or infused butter. Common products include:
  - Gummies/lollipops/taffy/candy
  - Brownies/baked goods
  - Sodas/drinks
  - Infused oil or butter mixed in with other food items such as popcorn or salad dressing
- **Hemp Seed Oil**—Non-psychoactive oil obtained by pressing hemp seeds. Cold-pressed, unrefined hemp oil is dark to clear light green in color, with a nutty flavor.
- **Inclusion Rate**—A measure, expressed as a percentage by weight or volume, that quantifies the concentration of hemp extract or cannabinoids in a food product or dietary supplement. An inclusion rate allows for the creation of recommended daily intake values for humans and animals in food and supplement products.
- **Tincture**—Tincture is a term used to refer to cannabis extracts/concentrates typically delivered under the tongue (sublingually) or in a mucous membrane via an eyedropper. Tinctures are intended to be a fast delivery method without smoking or swallowing.
- **Topicals/Transdermals**—Topicals and transdermals are consumption methods that use a lotion or patch to apply the cannabinoids to your skin.

[23] FDA perspective on functional food from the *American Journal of Clinical Nutrition.*
[24] 21 U.S.C. 360ee(b)(3)[.]

- **Vape/Vaporizer/Vape Pen/Vape Cartridge**—A consumption method that uses heat to vaporize concentrated oil, which is then inhaled.

17. Marketing and Labeling Guidance Stakeholder Recommendation

Continue to establish guidance for retailer and manufacturer marketing and labeling which harmonize with national and international standards, when appropriate, for consumable hemp products.

Basis & Purpose of Recommendation

The FDA maintains oversight of hemp-derived consumer products under the Federal Food, Drug, and Cosmetic Act.[25] FDA jurisdiction includes hemp and hemp-derived products as a food and food ingredients, and an ingredient for body products, cosmetics, dietary supplements, and therapeutic products. Analogous guidance made for other supplements and products provides the basis for the guidance presented here.

Although hemp-derived products are relatively new to the marketplace, there are several precedents for other products with unique ingredients. Guidance on marketing and labeling requirements has evolved to assure that consumers and buyers are not misled. This Federal guidance will apply to consumable hemp products.

Regulatory Program

Existing Program.

The Role of the FDA

FDA is a Federal agency within the Department of Health and Human Services charged with protecting and promoting public health through oversight of a broad range of products. The farm bill, by preserving FDA authority while removing other restrictions under the CSA, made FDA much more practically relevant to many hemp stakeholder, including those who may not have experience dealing with the FDA.

The FDA has discovered many hemp products (including CBD products) being marketed with claims of therapeutic benefit, or other drug claims, without having gone through the drug approval process. These include CBD products marketed for serious diseases and conditions like cancer, Alzheimer's disease, opioid use disorder, and pain. In response, the FDA actively oversees the sector and sends warning letters to companies unlawfully marketing such products.

Guidance for the Manufacturing Sector

Unlike drugs approved by FDA, the manufacturing processes of hemp-derived products is not subject to FDA review as part of the drug approval process, and FDA has not evaluated whether these products are effective for their intended use, proper dosages, interactions with other FDA approved drugs, or potentially dangerous side effects or other safety concerns.

Outside the drug space, enterprises are also marketing hemp products, including human and animal foods, as well as dietary supplements and cosmetics: each has a different regulatory framework. Unlike drugs, foods, dietary supplements, and cosmetics rarely need to be approved by FDA before they can be marketed in interstate commerce. One exception is food additives, which the FDA must determine to be safe for specified conditions before they can be added to foods unless the substance is "generally recognized as safe" (GRAS) by qualified experts.

Similarly, for production and companion animal feed, the process for approval is overseen by the FDA Center for Veterinary Medicine. Animal byproducts or animals fed unapproved ingredients may not enter the stream of commerce and it is not legal to feed unapproved animal feed ingredients. For dietary supplements, if the product contains a new dietary ingredient—meaning a dietary ingredient that was not marketed in the United States before October 1994—the manufacturer generally must notify FDA before coming to market.

Approved food additives can be found on the FDA list of GRAS ingredients. Most recently added to this list (effective December 20, 2018) are hulled hemp seeds, hemp seed protein, and hemp seed oil. The GRAS recognition also included a statement that *Cannabis sativa* L. oil seeds do not naturally produce cannabinoids. These items can now be included in human foods provided they comply with all other requirements and do not make disease treatment claims.

Guidance on Broader Cannabinoid Products

Two statutory provisions have relevance for cannabinoid products:

[25] 21 U.S.C. § 301 *et seq.*

1. Under the Federal Food, Drug & Cosmetic Act, it's prohibited to add a substance into food if that substance has been approved as a drug, or if that substance has been the subject of public clinical investigations; and
2. A product that includes such a substance is excluded from the definition of a dietary supplement.

These provisions have an exception for substances in foods (including supplements) before they were ever approved or studied as drugs. So, for example, substances like caffeine and baking soda have this type of grandfathering in foods and beverages. For cannabinoids and CBD, the FDA has concluded this exception does not apply.

Guidance for the Retail Sector

The top FDA regulatory priority is to protect public health. This priority includes alerting consumers when products pose health and safety risks, such as when product manufacturers make claims to prevent, diagnose, treat, mitigate, or cure serious diseases.

For example, the agency has warned companies to stop selling CBD products claimed to prevent, diagnose, treat, mitigate, or cure serious diseases such as cancer, Alzheimer's disease, psychiatric disorders, and diabetes. Misleading, unproven, or false claims associated with CBD products may lead consumers to put off getting important medical care or to ignore symptoms associated with serious diseases.

Unapproved CBD products, which could include cosmetics, foods, products marketed as dietary supplements, and any other product making therapeutic claims, generally have not been subject to FDA evaluation for:

- Indication and efficacy for treating a specified disease or medical condition;
- Proper dosage;
- Interactions with other drugs or foods; or
- Presence of dangerous side effects or other safety concerns.

Besides safety risks and unproven claims, the quality of many CBD products may also be in question due to a current lack of processing controls and practices. For example, the FDA has tested some products, and many were found to not contain the levels of CBD claimed on the label. There are also reports of CBD potentially containing unsafe levels of contaminants (*e.g.,* pesticides, heavy metals, THC).

FDA has not approved CBD for any use in animals and the concerns regarding CBD products with unproven medical claims and of unknown quality equally apply to CBD products marketed for animals. In addition, hemp seeds and other hemp byproducts are not currently approved by the FDA for use with animals. The FDA recommends pet owners talk with their veterinarians about treatment options with CBD for their pets.

Implementation

In general, CDPHE already has a framework in place that adopts related FDA policies. The following action items are needed to implement this recommendation.

- Continue to guide packaging and labeling for hemp products that extend FDA guidance where appropriate; and
- Develop programs as needed to support public health and consumer safety related to hemp products.

Key Stakeholders

CDPHE, CDA, FDA, Colorado hemp manufacturers and retailers[.]

18. Quality Assurance Certification Program

Stakeholder Recommendation

Develop a quality assurance program, such as a "Good Hemp Program", that establishes minimum standards for Colorado producers/manufacturers to qualify for special certification/designation. The program will collect fees to fund hemp research and promotion.

Basis & Purpose of Recommendation

Certification provides a marketing alternative to commodity and unbranded markets that allows individual producers to be included under an established umbrella program and label, organized, and overseen by a third-party. The program establishes criteria to promote a set of differentiated characteristics. Third-party certification provides independent verification of product or production claims. Securing

a reputable third-party certifier is a way to differentiate Colorado grown hemp products from others on the market.

Another potential motivation for having a state certification program is that it allows for Colorado to maintain control over its standards for product integrity. For example, the USDA organic program has an integrity database,[26] that consumers and buyers can use to identify reputable suppliers. A similar system could support the Colorado hemp industry.

Regulatory Program

Current Program. There is no current state-level certification and promotion specific to hemp products. Hemp and hemp products can currently qualify for any other similar agricultural or locally produced product initiative.

Recommended Enhancement. Certification programs and labels depend on establishing a set of production processes and quality standards that verify whether the certified product have certain qualities or attributes valued by consumers.

A certification process offered by the USHA covers several stages of production including cultivation, processing, and manufacturing.[27] This program offers a sensible starting point for to examine key features of a quality assurance program.

Relevant components include:

- Cultivators
  - Registration, personnel guidance, sampling and handling practices, contaminant testing and hemp cannabinoid quantification (pre-harvest and post-harvest), transportation and storage guidance, and checklists for best practices
- Processors, Manufacturers and Brand Owners
  - Similar guidance topics as those for cultivators (employee and facility guidance),
  - Post-harvest material handling under process controls and testing to maintain potency and assure purity.
  - Quality Management Systems including clear direction on any point, step, or stage in the manufacturing process where control is necessary to ensure the quality of the hemp product, very similar to HACCP in food products.
  - Guidance on product packaging, labeling, and storage that aligns closely with other third-party certification programs, such as the U.S. organic program.
  - Importance of recordkeeping, supplier specifications, know your supplier practices, and packaging and labeling best practices.
- Retailers
  - There is no current USHA guidance for retailers.
  - Retailers in organic foods often become certified by USDA as a branding resource and to demonstrate their commitment to delivering organic foods to their customers.
  - License or accreditation for retailers to assure hemp products have been correctly handled from production through delivery to the customer.

Implementation

The following action items are required to implement this recommendation:

- New rules and definitions for a Colorado hemp quality assurance program; and
- Procedures for audit services to verify compliance at several stages of the supply chain.

Key Stakeholders

CDA, Colorado hemp cultivators, processors, manufacturers, retailers[.]

19. State Procurement of Industrial Hemp Products

Stakeholder Recommendation

Encourage state procurement and use of industrial hemp products.

Basis & Purpose of Recommendation

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[26] *https://organic.ams.usda.gov/Integrity/Default.aspx.*

[27] *https://ushempauthority.org/assets/uploads/USHA-Guidance-Procedures-Version-2.0-WEB-VERSION-Rev-3-25-20_200504_141204.pdf.*

With industrial hemp, there are concerns among Colorado hemp industry stakeholders there may be less than optimal investment in the processing and manufacturing of hemp industrial products until the market is "proven." Yet, the market may not grow if there continues to be a few industrial hemp product options to purchase. This is an expected challenge for a sector prohibited for so long, and where there is little historical market data or supply chain expertise to support an emerging product market.

The State of Colorado can support the Colorado hemp industry through encouraging procurement and use of hemp products by state agencies and institutions.

Regulatory Program

Current Program.

Colorado Procurement Overview

Procurement in Colorado is decentralized—most state agencies conduct their own solicitations. Businesses wanting to sell goods or services to the state government must promote themselves to individual state agencies and actively search for opportunities on the state procurement website. Colorado currently has a preferred purchasing program for recycled products that can serve as a model for a hemp product preference.[28]

Reciprocity Considerations

Colorado law mandates that resident bidders be given preference over non-resident bidders equal to the preference given by the state in which the nonresident bidder is a resident, *i.e.,* if a non-resident bidder is four percent lower than the resident bidder but the state of residence of the non-resident bidder awards a five percent preference to in-state bidders, then the Colorado bidder becomes the lowest bidder by one percent.

Sustainability Considerations

Purchasing agencies may utilize life cycle costing and/or value analysis in determining the lowest responsible bidder. In bids where life cycle costing or value analysis is to be used, the specifications shall indicate the procedure and evaluative factors to be considered. When appropriate, specifications issued and/or used by the Federal Government, other public procurement units, or professional organizations may be referenced by the State of Colorado. Bidders may have to certify these standardized specifications have been met.

Recommended Enhancement.

State Preferential Practices

Stakeholders recommended the state could include hemp as part of a preferred product program. A range of "price preferences" from 3–10 percent across states for products that would fall under other policy-driven "preferred" categories. Among sectors, agriculture, forestry, and fishery products are commonly mentioned, for sustainability outcomes, local site preferences, recyclables, and other sustainable products as evaluated by life cycle analyses, renewable fuels, corn-based plastics, and printing were common across states.

Implementation

The following action items are needed to implement this deliverable. Items include:

- Modify the Procurement Code through legislative action and rulemaking process;
- Encourage the State Purchasing and Contracts Office (SPCO) to include hemp-based products on the state pricing agreement list;
- Integration of industrial hemp products into current initiatives:
  - Colorado Procurement Technical Assistance Center (PTAC)
    - The purpose of the Colorado PTAC is to generate employment and improve the general economic condition of the state by assisting Colorado companies in obtaining local, state, and Federal Government contracts.

[28] CO Procurement Code & Rules 24–103–903(5): When purchasing any product with public funds, any procurement agent may purchase products or materials with recycled content, that have been source reduced, that are reusable, or that have been composted[.]

- PTAC provides procurement technical assistance to help in selling products or services to government agencies.

○ HUBZone Small Business Administration Empowerment Contracting Program

- The HUBZone Empowerment Contracting program provides Federal contracting opportunities for qualified small businesses in federally designated distressed areas.

Key Stakeholders

Department of Personnel and Administration, SPCO, Colorado hemp industry[.]

Finance and Insurance

20. Develop Guidance & Best Practices

Stakeholder Recommendation

Provide guidance and best practices to financial services institutions and insurance carriers to encourage them to provide services to Colorado hemp businesses. Colorado can be the bellwether for guidance and outreach to institutions seeking to serve the industrial hemp marketplace. Guidance can include written materials and direct stakeholder engagement, rulemaking, or general outreach.

Basis & Purpose of Recommendation

This recommendation seeks to destigmatize opening and holding accounts for hemp and hemp-related businesses. With enhanced guidance and stakeholder engagement, it is hoped that providers will serve the industrial hemp industry similar to other agricultural industries.

Regulatory entities and associated authorizing statutes involved with this recommendation are:

- CRS § 10–1–101, *et seq.* (Insurance)
- Division of Insurance Protocol for Engaging Stakeholders in Rulemaking
- CRS § 11–101–101, *et seq.* (Banks)
- CRS § 11–110–101, *et seq.* (Money Transmitters)
- CRS § 11–30–101, *et seq.* (Credit Unions)
- CRS § 11–40–101, *et. seq.* (Savings and Loan Associations)

Regulatory Program

Current Program.

Since the passage of Colorado Amendment 64, Federal and state regulators published cannabis-related guidelines for banks, credit unions, and money services businesses. More recently, Colorado regulators published a variety of guidance on marijuana and hemp that includes:

- Division of Financial Services, April 4, 2019, "BSA Expectations for Industrial Hemp"
- DORA, January 2020 "Roadmap to Cannabis Banking & Financial Services"
- Division of Banking, January 31, 2020 "Hemp Industry Guidance"

Similarly, the National Association of Insurance Commissioners maintains a cannabis insurance working group, of which the Colorado Insurance Commissioner is a member. As most insurance is not a single-state enterprise, Colorado works with regulators across the country to encourage the introduction of innovative products, particularly in the admitted market (as opposed to surplus lines), to cover industrial hemp and to remove any barriers to the offering of such products.

Despite more recent changes to industrial hemp laws at the Federal level, providers of financial services and insurance remain uncertain about the degree to which they can serve hemp-related companies and the compliance and reporting practices that such relationships require. Some Federal banking regulators have issued helpful clarifications regarding hemp accounts, but banks remain subject to a complex set of Federal legal requirements and regulatory expectations, requiring specific guidance to ensure they act appropriately. Representatives from the American Bankers Association have thus encouraged banks to wait until more guidance is set forth before providing financial products to hemp-related businesses.

In response to the need for additional guidance, on June 29, 2020, the Financial Crimes Enforcement Network (FinCEN), a division of the United States Treasury,

released FIN–2020–G001, *Guidance Regarding Due Diligence Requirements Under the Bank Secrecy Act for Hemp-Related Business Customers,* will help clarify a bank's regulatory requirements if it provides banking services. In addition, on July 6, 2020, the Conference of State Bank Supervisors (CSBS), released the CSBS Cannabis Job Aid, a resource for both bankers and bank examiners, that provides information and risk assessment guidance for banks that wish to provide banking services to the hemp industry.

Recommended Enhancement.

Developing a guidance program informs and destigmatizes industrial hemp, hemp products, and hemp-related businesses through facilitated sessions for state and local regulators; state-chartered financial institutions, domestic insurers; and the general public, whether for producers, vendors, or other stakeholders, as determined necessary.

The proposed enhanced outreach program builds upon existing efforts of DORA and the work of cross-functional groups like the cannabis insurance working group of the National Association of Insurance Commissioners. Such efforts would focus on three constituencies: regulators, industry, and the public. Regarding the Division of Insurance, guidance and education may also focus on the need for multi-state admitted lines specifically focused on coverage thresholds built into the 2018 Farm Bill for industrial hemp; that is, the division may wish to engage in further discussions with regulatory colleagues in other states and industry stakeholders regarding insurance products that would cover industrial hemp with THC levels over statutory limits.

Implementation

The following action items are needed to implement this recommendation. Items include:

- Development of targeted meetings with Federal and state banking, financial services, and insurance regulators
- Development of targeted meetings with banking & financial services institutions and their respective trade associations

Key Stakeholders

DORA (Divisions of Insurance, Banking, and Financial Services), banking and insurance trade groups, and other key identified groups[.]

21. Expanded Data Availability

Stakeholder Recommendation

Make available aggregated industry registration data and other information to financial institutions and insurance carriers to expedite access to account services.

Stakeholders recommended CDA and CDPHE provide aggregated registration information in structured formats, subject to development of key standards and norms, to the finance and insurance industry to help these institutions expand services to all qualified participants in the hemp supply chain. Moreover, stakeholders recommended that Colorado should allow CDA and CDPHE to release or verify specific application information to a financial or insurance institution upon the written request of the registrant to facilitate and expedite account servicing.

Basis & Purpose of Recommendation

Accurate de-identified information and standardized figures are key for risk management, insurance industry actuaries, underwriting, and pricing, whether in the hemp industry or otherwise. Data points of significant interest included registration, testing, and regulatory compliance information. Making such data available would encourage coverage of commercial risks in the same manner as other industries and emphasize that providing coverage to hemp businesses requires the same application of general commercial insurance principles as other agricultural concerns. Access to such information can also serve as one tool among others in a holistic underwriting process, much like other sources of public data relied upon to understand a specific business' overall efficiency and competency compared to similarly situated businesses.

Making a limited set of registration data available serves two goals. First, financial institutions and insurance carriers can more easily determine whether a registrant complies with state and Federal law when opening and maintaining an account on their behalf. Second, if registrants opt to provide more detailed information, account holders and service providers can use that data to reduce costs associated with ongoing servicing of hemp-related accounts. Transitioning toward access

to structured data is also expected to facilitate better understanding and analysis of data in the aggregate.

Regulatory Program

Current Program.

CDA and CDPHE periodically publish information that shows active registrations. CDA periodically updates the list but does not include underlying information regarding changes in license status (if any) nor any other data. CDPHE updates their information regarding the number of processors registered. Regularly published aggregated statistical data on hemp is currently lacking in Colorado.

Recommended Enhancement.

Initially, Colorado should develop uniform standards for hemp-related data so information can be accurately collected and provided both to the USDA under the IFR, and through a public application platform. With the foregoing, CDA should make aggregated de-identified data available both in terms of structured information and in an analysis performed and provided through partnerships among CDA, CDPHE, CSU, and OEDIT.

Implementation

The following action items are needed to implement this recommendation:

- Establish a platform to provide aggregated data under Colorado Open Records Act and standards in which the date will be collected and provided;
- Modification to CDA rules to provide for platform-specific disclosures and opt-in that allows CDA to verify registration information as the request of the registrant
- Convene a stakeholder group if needed to define the data requirements, privacy concerns, and program operational characteristics

Key Stakeholders

CDA, CD[PH]E, DORA, CSU, Office of the Attorney General, hemp industry associations, banking, and insurance trade[.]

Future Research & Policy Development

The following regulatory issues were identified during the stakeholder meetings and subsequent proceedings as issues or subjects that needed further research and policy development.

- *Feminized seed and clone certification.* Convene a stakeholder process to develop guidance and determine the feasibility of a feminized seed certification program and for the operational model and facilities for a clonal certification program. This program will involve CSGA and CDA.
- *Cross-pollination.* Research the distance, pollen viability, size, and other factors that determine risk for hemp cross-pollination and recommend thresholds for notification.

- *Retaining value in the supply chain.* Convene a stakeholder process to determine the rules and procedures to develop secure supply channels that allow non-compliant plant material to be processed for non-consumable industrial uses; or to have the THC extracted and removed from the stream of commerce. In addition, use existing regulatory avenues for non-compliant plant material including advocating for exemption of mature stalks and seeds from destruction.
- *Co-location of hemp and licensed marijuana businesses.* Prohibit the co-location of marijuana and hemp cultivation, processing, and manufacturing businesses until Federal laws allow. Explore an efficient regulatory structure to allow for the co-location of all types of cannabis cultivation and/or manufacturing facilities.
- *Electronic Traceability System.* Convene a process to develop specifications, security, and documentation requirements for an ETS that will ensure a secure chain of custody for hemp products in Colorado.
- *Transport of concentrated intermediate products.* Determine a transportation protocol for hemp concentrates with THC over statutory limits. These are business-to-business transactions where products transported will be further processed to bring THC levels into compliance before sale to consumers.
- *Non-consumable industrial hemp manufacturing.* Determine whether additional regulatory oversight of industrial products manufacturing operations is needed and if so the lead regulatory agency and most advantageous regulatory framework.
- *Emerging cannabinoid analytes, inhalable and suppository hemp.* Monitor and address new cannabinoid analytes, such as Delta-8 THC, as they are identified and be prepared to address in policy and regulation. Assure Colorado's approach aligns with Federal hemp/cannabis laws and state marijuana laws. Determine the best regulatory treatment for inhalable and suppository hemp, whether direct initial regulation by the state or by deferring to the Federal Government timeline for hemp product regulation.
- *Quality assurance program.* Determine the costs and benefits of developing a quality assurance program that sets quality, purity, and process standards and promotes a Colorado brand of hemp products.
- *Retail Framework.* Convene a stakeholder process to develop a retail framework for hemp that integrates into an existing retail framework for food or dietary supplements.
- *Financial services and insurance data.* Determine data gaps that exist for insurance and financial institutions and the specific requirements and funding needed to expedite access to services[.]

The items listed above may require a task force or stakeholder process to further develop the proper regulatory scope and implementation action items.

Appendices

Appendix A. CHAMP Stakeholders and Participants

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Appendix B. Detailed Industry Analysis

Hemp is an emerging specialty crop, both nationally and in Colorado, that has received considerable attention from producers, consumers, private businesses, and policymakers. Cultivation of the crop may serve as an alternative cropping enterprise that improves grower profitability and as an engine of economic development. Hemp can be manufactured and processed into numerous industrial and commercial goods for which there is a national and international demand. Industrial applications range from building materials and textiles to food ingredients and wellness products. However, given limited research and development examining domestic uses, there is potential for many other applications to emerge.

While hemp may hold promise for Colorado, integrating this sector into the state's agricultural and economic landscape also creates challenges. The CHAMP initiative is one step that Colorado has taken to identify and address potential obstacles. This section provides context for understanding hemp markets, cultivation, and processing in Colorado and nationally, and discusses possible future directions for the industry.

Background

The terms "industrial hemp" and "hemp" both refer to a plant of the *Cannabis sativa* L. species and any part of that plant (including the seeds, stalks, leaves, and flowers whether growing or not) and all extracts and compounds derived from the plant (such as cannabinoids, terpenes, isomers, or acids) with a delta-9 tetrahydrocannabinol, or THC, concentration of 0.3 percent or less on a dry weight basis. THC is the primary intoxicating component of cannabis. Cannabis plants, plant parts, and derivatives with THC levels that exceed 0.3 percent are considered marijuana, which remains a Schedule I controlled substance and is regulated by the DEA.

Hemp is not a new crop for Colorado or U.S. producers. Before and during World War II, the U.S. grew hundreds of thousands of acres, reaching 220,000 acres in 1943.[29] Such production was largely for manufacturing rope and sailing cordage and was highly incentivized via Federal Government price supports such as the war-era Hemp for Victory campaign. Removal of price supports following the war led to a sharp decline in prices and widespread closure of processing mills followed. That, coupled with increased domestic taxes for hemp production under the Marijuana Tax Act and imports from parts of Latin America, Caribbean, and Asia, made growing and processing hemp unprofitable. Production remained largely negligible there-

[29] Johnson, N. 2019. *American Weed: A History of Cannabis Cultivation in the United States.* (*https://www.researchgate.net/publication/334452841_American_Weed_A_History_of_Cannabis_Cultivation_in_the_United_States*) ECHOGEO 48.

after until it was officially prohibited in 1970 under the CSA due to its' similarity to marijuana.

Following over 4 decades of prohibition, hemp was reintroduced as a legal crop in the United States under the 2014 Farm Bill.[30] The 2014 Farm Bill allowed for the establishment of state, Tribal, or territory hemp pilot programs and did not require state production plans to be approved at a national level by the USDA. Colorado was an early mover, being among the first states to establish a hemp program, and one of only four states to report acreage in 2014. The 2018 Farm Bill[31] allowed for hemp production in all states, Tribal entities, and territories on the condition these programs obtain approval from the USDA and meet requirements in the IFR.[32]

Market Context

Hemp in the United States is, and will likely remain, highly regulated compared to other commodity crops. This stems from the finely drawn distinction that separates hemp from marijuana based on THC level, combined with the inability to visually distinguish between these variants of the cannabis plant. Producers or entities intending to grow, handle, or process hemp must generally obtain a license, or other types of registration permit, for these purposes. The licensing requirements are necessary for inspection and enforcement purposes, but also have the added benefit of making available some market-related information on cultivation and processing at the national and state levels.

In 2019, U.S. land area registered for industrial hemp cultivation surpassed 500,000 acres, with Colorado accounting for over 13 percent of the total.[33] While this more than doubles previous peak production in 1943, not all registered acres are planted. To put this distinction in context, one recent hemp production study put 2019 U.S. planted acres closer in line with that previous peak at 200,000 acres (Hubbard, 2020). It furthermore estimated that most acres (>90 percent) were planted to produce hemp flower for cannabinoid extraction. Just under 80% of the total area was intended primarily for CBD extraction and another 14 percent was intended primarily for CBG extraction, another cannabinoid compound that has formed some traction among consumers. Hemp intended for oil seed and fiber accounted for much smaller areas, representing 3.6 percent and 2.5 percent of total planted area, respectively. As the market for CBD and other cannabinoids stabilizes, acreage planted for oil seed, fiber, and other uses is expected to increase.

Many growers received healthy profits in the early years of the hemp pilot programs. A relative scarcity of raw hemp material and domestically produced hemp flower to supply an expanding CBD market helped to maintain wholesale prices for hemp and hemp products well above break-even levels. Production budgets for hemp floral material in 2019 showed variable costs exceeding $10,000 per acre, with clones or transplant plugs alone representing 70–80 percent of this total.[34] In mid-2019, however, industry benchmark reports showed a steep decline in national wholesale prices for raw and processed hemp products of up to 80 percent,[35] resulting in reduced to negative profitability for many growers.

The decline in wholesale prices was due to both supply and demand factors. On the supply side, expansion of hemp production to new states and dramatic growth in planted acreage over a short period in pilot program states made hemp biomass relatively more abundant than it had been earlier. Total U.S. hemp production had been only 1,866 acres in 2014,[36] as compared to the 200,000 acres estimated for 2019.

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[30] Agricultural Act of 2014, (*https://www.govinfo.gov/content/pkg/PLAW-113publ79/pdf/PLAW-113publ79.pdf*) Public Law 113–79.

[31] Agricultural Improvement Act of 2018 (*https://www.ers.usda.gov/agriculture-improvement-act-of-2018-highlights-and-implications/*).

[32] *Federal Register,* Vol. 84, No. 211.

[33] Drotleff, Laura. *2020 Outlook: Licensed U.S. hemp acreages fall 9% from 2019 but grower numbers increased 27%.* June 19, 2020. HEMP INDUSTRY DAILY, *https://hempindustrydaily.com/2020-outlook-licensed-u-s-hemp-acreage-falls-9-from-2019-but-grower-numbers-increase-27/* (last visited July 22, 2020).

[34] Mark and Shepard. 2019. *Industrial Hemp Budgets 2019.* University of Kentucky Extension, Lexington, KY, *https://agecon.ca.uky.edu/budgets#Specialty_Crops* (last visited July 7, 2020).

[35] *Hemp Benchmarks.* 2020a. U.S. Hemp Extraction Survey May 2020, *https://www.hempbenchmarks.com/special-reports/* (last visited July 20, 2020). *Hemp Benchmarks.* 2020b. Price Commentary. April 2020 Hemp Spot Price Index Report, *https://www.hempbenchmarks.com/special-reports/* (last visited May 21, 2020).

[36] Mark, Tyler, Jonathan Shepherd, David Olson, William Snell, Susan Proper, and Suzanne Thornsbury. February 2020. *Economic Viability of Industrial Hemp in the United States: A Review of State Pilot Programs,* EIB–217, U.S. Department of Agriculture, Economic Research Service.

At the same time, extraction and processing plants faced hurdles in keeping up with the supply of raw hemp material. In a 2020 study of over 200 hemp cannabinoid extraction facilities, over 70 percent of respondents had a daily input capacity of 1,000 pounds of hemp floral material or less, including about ⅓ with a capacity under 100 pounds per day. For reference, a generous estimate of national yield per acre for hemp floral material in 2019 is 1,520 pounds per acre.[37] Consumer demand for CBD and other hemp-based products grew at a slower pace than anticipated in early 2020 due to COVID–19 related disruptions and the stagnating economy that followed.

Growers produced more hemp in 2019 than could be processed or sold. As of mid-2020, there are many reports of unsold raw and processed hemp products remaining in storage from the 2019 production year. National hemp acreage in 2020 is estimated to decrease, with one study estimating a nine percent overall decline as compared to 2019.[38] While hemp commodity prices declined sharply, downward price movement for inputs like clones and transplant plugs was slower to follow. Nevertheless, some producers have reported lower costs for these items in 2020 and wholesale prices appear to be stabilizing from their recent drop for the time being.

A further consideration is a global market for hemp-based industrial and commercial processed goods besides produced raw hemp materials. There is a large and established global market for around 25,000 hemp-based products including textiles, recycling, automotive, furniture, food and beverages, paper, construction materials, and personal care and wellness products including cosmetics. While there is little information on U.S. retail sales of hemp products, reports estimate that as early as 2016 hemp product sales amounted to almost $700 million.[39] Domestic retail sales were concentrated in a variety of categories such as CBD and supplements, personal care products, textiles, foods, and other applications and consumer products.

Hemp production is permitted in around 30 countries with an estimated aggregate acreage of around 225,000 acres as of 2016. In 2017, the U.S. imported $67.3 million worth of hemp material. Trade data is not available for finished products (such as textiles, construction materials, and paper products), thus the $67.3 million consists only of hemp seeds, oil, solids, and fibers used as inputs in further manufacturing.[40] In 2018, the largest supplier of U.S. hemp imports is Canada which accounts for 90 percent of the value of imports, followed by China and Romania.

Growth in global hemp production and relative costs of production across countries is expected to be a significant determinant of U.S. hemp land area expansion, especially for hemp fiber which is already widely traded in international markets[41] and used primarily for industrial applications rather than consumed as a food ingredient or supplement.

Hemp Cultivation in Colorado

This section provides further context on hemp cultivation in Colorado. Despite being an early mover, the sector is yet to mature and there are numerous market information gaps. In this section, we summarize the available data to provide a picture of the industry and characterize some recent trends within the sector. All hemp growers must register with the CDA. Annual registration costs are $500 plus an additional $5 per acre and an additional $0.30 per hundred square feet of hoop house, greenhouse, or other indoor space. If the registered land area (in acres) includes the hoop house, greenhouse, or other indoor space within its boundaries, then both the outdoor acreage and indoor square footage can be filed under a single registration.

CDA records provide information on the number of registrations and registered land area between 2014 and late July 2020. Between 2014 and 2019, the number of registrants and registrations grew each year (solid lines), resulting in about a ten-fold increase during that period (*Figure B1*). As of late July 2020 (dashed lines), the number of registrants and registrations were 40 percent and 45 percent below their

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[37] Hubbard, Chase. *2020 Hemp Crop Production Survey Results.* The Jacobsen Publishing, *https://thejacobsen.com/wp-content/uploads/2020/05/2020-Hemp-Survey-Results.pdf* (last visited July 22, 2020).

[38] Drotleff, Laura. *2020 Outlook: Licensed U.S. hemp acreages fall 9% from 2019 but grower numbers increased 27%.* June 19, 2020. HEMP INDUSTRY DAILY, *https://hempindustrydaily.com/2020-outlook-licensed-u-s-hemp-acreage-falls-9-from-2019-but-grower-numbers-increase-27/* (last visited July 22, 2020).

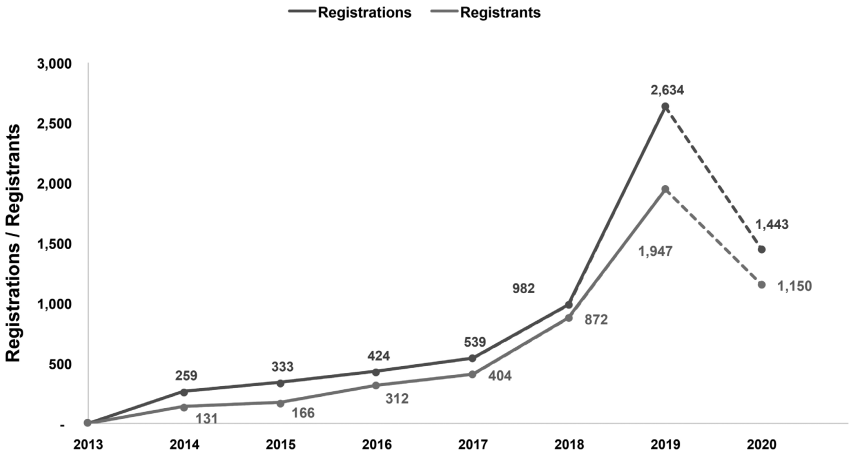
[39] Johnson, Renee. *Hemp as an Agricultural Commodity.* June 22, 2018. Congressional Research Service Report. 7–5700. RL32725, *https://fas.org/sgp/crs/misc/RL32725.pdf* (last visited July 22, 2020).

[40] Johnson, Renee. *Hemp as an Agricultural Commodity.* June 22, 2018. Congressional Research Service Report. 7–5700. RL32725, *https://fas.org/sgp/crs/misc/RL32725.pdf* (last visited July 22, 2020).

[41] OED. 2020. *Hemp Fibers Profile.* Organization for Economic Complexity, *https://oec.world/en/profile/hs92/hemp-fibers* (last visited July 30, 2020).

comparable 2019 totals, respectively. The numbers shown represent lower bounds on the number of registrants and registrations for 2020, however, because some registrations that are set to expire in fall 2020 will be renewed. The final numbers will depend on the registration renewal rate in the coming months. An analysis of 2019 records indicated that 54 percent of registrations included outdoor area only, 15 percent included hoop house, greenhouse, or other indoor areas only, and 31 percent included both outdoor and indoor areas.

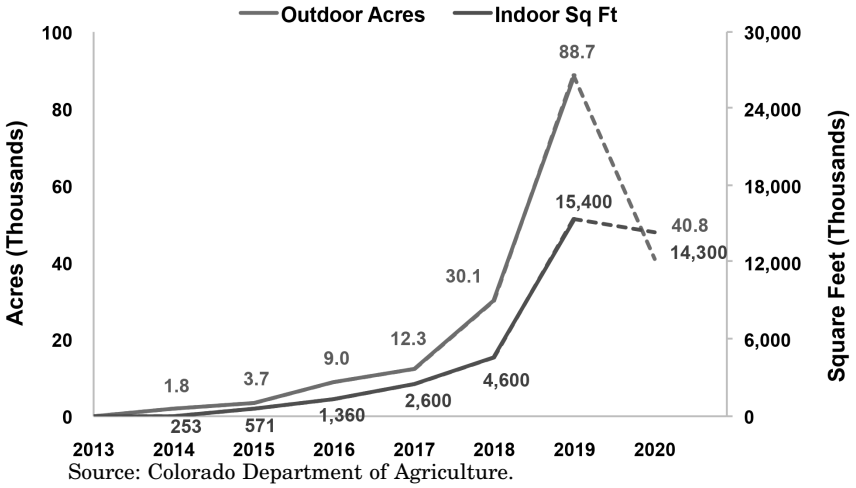
Figure B1. Colorado Hemp Registrants and Registrations, 2014–July 2020



Source: Colorado Department of Agriculture.

The total registered land area also increased annually between 2014 and 2019, but at a more rapid pace than registrations (*Figure B2*), indicating operations increasing in size. In terms of both registered acres and indoor square footage Colorado saw a forty-fold increase. Records for 2019 show a median land area of around 20 acres for registrations with an outdoor area only. Indoor only registrations had a median area of about 3,600′^{2}. Registrations with both indoor and outdoor areas had median land areas of 7 acres and 3,000′^{2}, respectively. As of late July 2020, registered acres were down over 50 percent as compared to 2019. Registered square feet were similarly down about 41 percent. The number of registered acres is unlikely to change substantially given that the main outdoor planting window has passed. Square footage is more likely to rise given that indoor cultivation can occur later into fall and winter to produce clones, transplants, or seeds, or potentially other off-season or niche production.

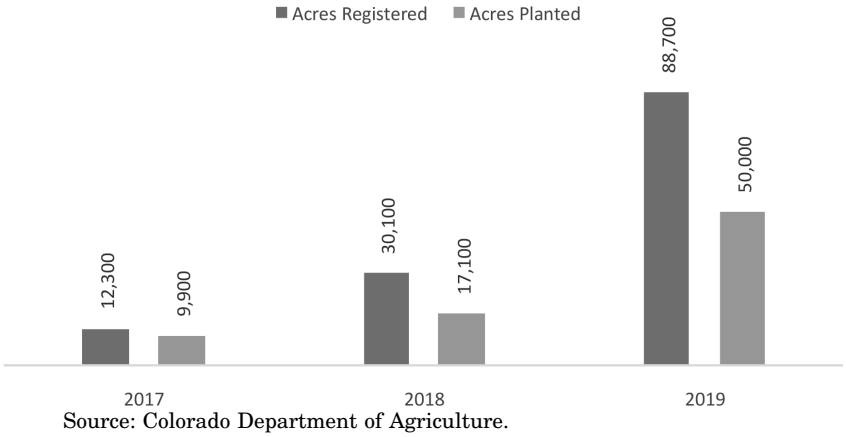
Figure B2. Registered Hemp Cultivation Space, 2014–July 2020



Source: Colorado Department of Agriculture.

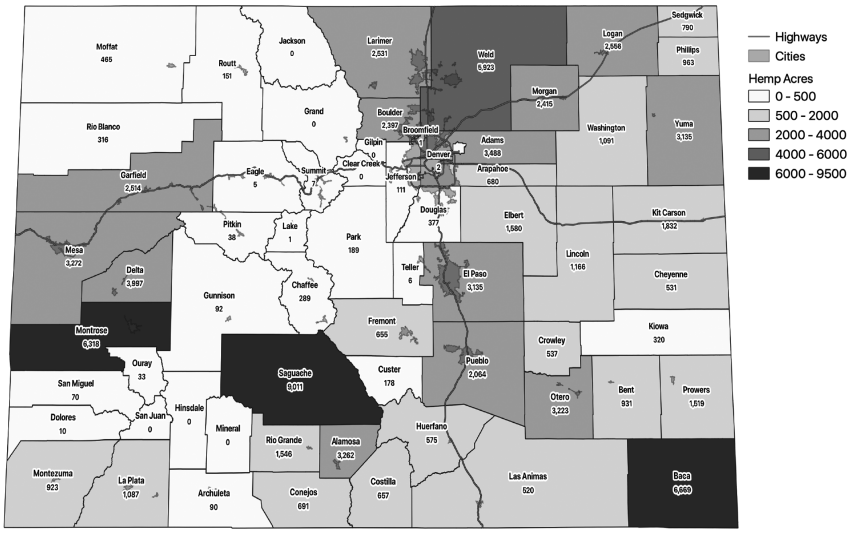
Actual acres and indoor square footage planted and harvested is consistently lower than the registered acres (*Figure B3*). There are many reasons that producers may register for hemp production but not actually plant such as grower inexperience, a lack of financing, or the inability to secure inputs like seed or clones. There are even fewer acres harvested than are planted but statewide data on acres harvested are not available. As shown in *Figure B4,* the majority of Colorado counties had some registered hemp acreage in 2019. Hemp production appears to be relatively well-distributed across the state, with some regional concentrations and a few counties with no registered acreage.

Figure B3. Colorado Hemp Acreage, Registered and Planted, 2017–2019



Source: Colorado Department of Agriculture.

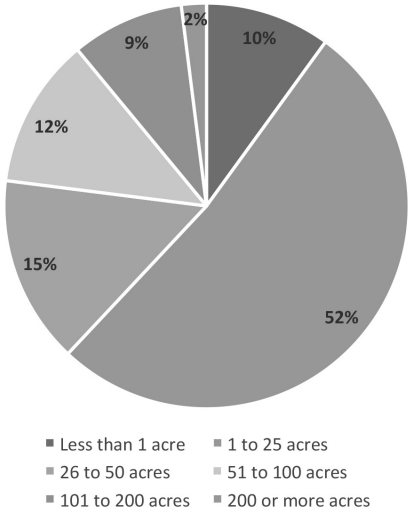
Figure B4. Colorado Registered Hemp Acres by County, 2019



Source: Colorado Department of Agriculture.

Many of the hemp registrations are for small parcels (*Figure B5*); over 60 percent of hemp registrations were for less than 25 acres whereas just over two percent were for 200 or more acres. Since the launch of Colorado's pilot program, hemp acreage in Colorado has also heavily tilted toward production for floral material to the same, or perhaps an even higher, degree as compared to the national picture.

Figure B5. Hemp Registration Size (Acres), 2019

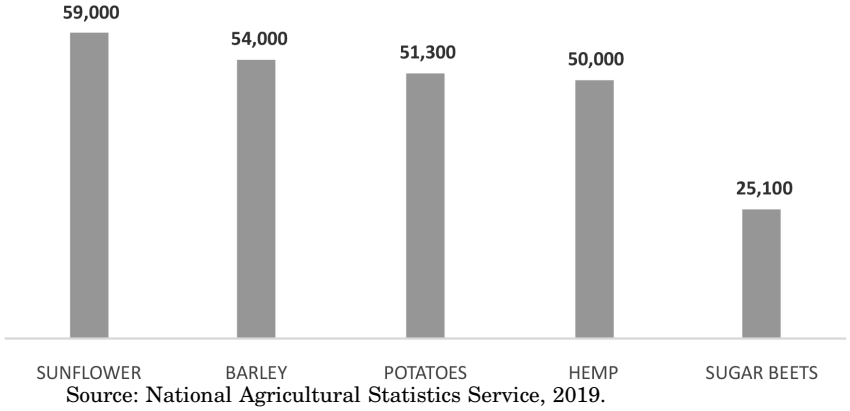


Source: Colorado Department of Agriculture.

One way to understand the relative footprint of hemp cultivation within Colorado's agricultural sector is to compare its planted acreage with other crops (*Figure B6*). While planted hemp acres in 2019 (50,000) were well below those for Colorado's top field crops such as corn (1,550,000 acres) and wheat (2,150,000 acres), they were comparable to other specialty crops within the state. Planted hemp acreage was very similar to sunflower, barley, and potatoes, and nearly double that for sugar

beets. This illustrates that, at its 2019 planted acreage level, hemp has grown to become an important specialty crop for Colorado.

Figure B6. Colorado Planted Acres by Crop, 2019



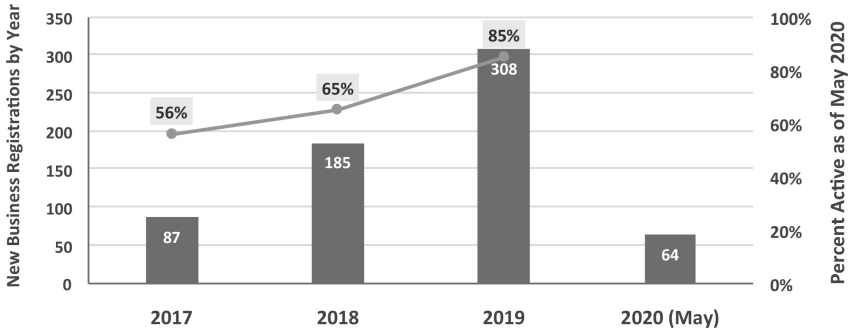
Source: National Agricultural Statistics Service, 2019.

Colorado's hemp sector extends beyond cultivation and handling to include processing and manufacturing. The number of processors and manufacturers using hemp or its derivatives (oils, extracts, concentrates, isolates, resins, seed meal, flour, *etc.*) as a food ingredient or nutritional supplement has grown rapidly in recent years. This includes existing businesses that have expanded their product lines to include hemp-based ingredients and new business creation. Using hemp in food and supplement manufacturing is allowed in Colorado under state statutes and is regulated by the CDPHE. The hemp ingredients used in the manufacturing process must come from an approved source, remain below allowable THC thresholds, and be appropriately labeled.

CDPHE maintains a list of registered hemp food and supplement manufacturers and approved storage facilities, such as warehouses and packing facilities, from which hemp may be sourced. *Figure B7* gives more insights into new hemp business registrations by year and survival rates as of May 2020. Starting in 2017, when records first became available, the total registered by CDPHE rose from just under 90 to over 640 by the spring of 2020. Before 2020, these numbers approximately doubled year over year. In 2020, the number appears lower, however, it represents only a partial year through May of 2020. The number of new hemp processing and manufacturing business starts is expected to continue to slow, as these measures usually start high after a new Federal or state business regulatory program is announced as entrants rush to a new market and then slow as the market becomes saturated.

As of spring 2020, about ¾ of all businesses registered continued to handle hemp materials. This represents just over ½ of the businesses first registering in 2017, ⅔ of the businesses first registering in 2018, and well above ¾ of businesses first registering in 2019. Overall, the number of food and supplement manufacturing businesses continued to grow in the first few years of Colorado's pilot program with more new businesses registering each year than closed or discontinued hemp processing.

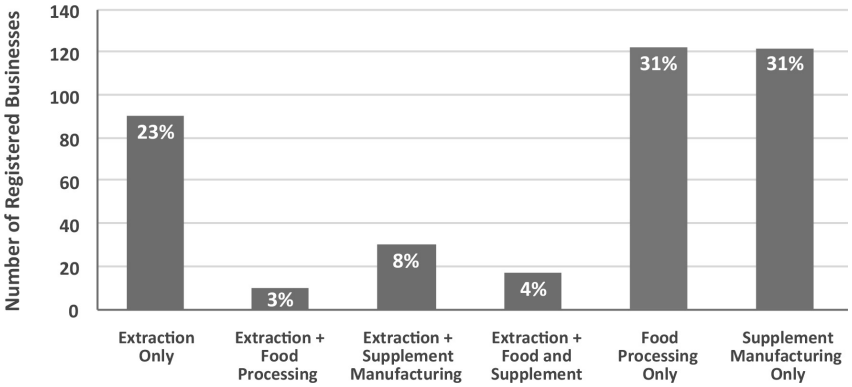
Figure B7. Colorado Hemp Extraction, Processing, and Consumable Manufacturing Business Growth, 2017–May 2020



Note: Includes all businesses that process and manufacture hemp for human or animal consumption.

Source: Colorado Department of Public Health and Environment.

Figure B8. Colorado Hemp Extraction, Processing, and Manufacturing Business Summary, 2017–May 2020



Note: Includes all businesses that process and manufacture hemp for human or animal consumption.

Source: Colorado Department of Public Health and Environment.

As of May 2020, the number of active CDPHE hemp registrants were relatively evenly distributed across extraction, food processing, and supplement manufacturing activities (*Figure B8*). Nearly 40 percent of the 392 active registrants were involved in extraction. About 60 percent of these extraction businesses were specialized within that processing activity alone whereas 40 percent were also involved in food processing, supplement manufacturing, or both. Additionally, businesses specialized in hemp food processing or supplement manufacturing activities, respectively, also represented large shares of the CDPHE registrants at just over 30 percent each. These businesses largely focused on hemp flower processing for CBD and other cannabinoid extraction; however, several food manufacturers incorporate hemp protein and oils from hemp seed into their processes.

This discussion highlights the growth in hemp processing and manufacturing activities related to the extraction, food, and supplements. Other hemp processing and manufacturing activities such as non-food industrial applications like textiles, paper, polymers, building materials, and specialized equipment manufacturing are also present in the state. These hemp processors represent a currently small industry in its early stages with unknown capacity, but with the potential to grow and establish itself as a significant agricultural and manufacturing industry and employer in the state. No comprehensive source of information on these sources was identified and therefore not summarized here.

Anecdotally, there are a relatively small number of industrial manufacturing facilities, operating at a relatively small scale in the state. Companies in their early stages have perfected methods to manufacture a diverse array of products, including concrete, insulation, plastics, animal bedding, and textile fabrics. These companies are in different stages of growth and scale. The industrial hemp products manufacturing sector represents a potential opportunity for growth and investment as demand and the industrial supply chain for hemp products in the U.S. matures. In that case, acreage in the state devoted to fiber and oil seed would be expected to increase.

Future Opportunities

Hemp has the potential to diversify farm incomes and drive economic growth in Colorado. Future levels of hemp production will be influenced by a multitude of factors that can be difficult to predict including the number of hemp growers, the hemp area planted, growth and diversification of intended end use, and processing and retail capacity. Most important, hemp enterprises must remain profitable relative to other agricultural alternatives. Industrial and consumer hemp products must also remain competitive with established and new alternatives.

The appropriate scale of production also remains an open question. Many hemp registrations under the pilot program were for small- or micro-sized areas (ten percent of 2019 registrations were less than 1 acre, for example, *Figure B5*). Business turnover will also play a role in the number of registrants producing hemp into the future. Many producers may simply experiment with hemp and decide not to continue with its cultivation. In addition, growers will need to understand the risk management tools at their disposal and be able to take advantage of them. Currently, there is a lack of information and confusion around crop insurance which needs to be clarified going forward.

While the industry is experiencing an oversupply of hemp biomass at the farm level there is anecdotal evidence suggesting that contracts (production and marketing) have played a role in grower access to processing and therefore profitability. If processing capacity remains relatively small scale this trend may continue, and producers would be discouraged from growing hemp for the spot market. The sector is also likely to be shaped by developing vertical relationships among extractors, processors, and industrial users or retailers. There will likely be continued supply chain issues related to uncertainty, such as around testing and processing, as the industry continues to grow and develop. These growing pains should ease, however,

as innovation pipelines increase yields, make THC levels more predictable and stable, and potentially reduce other risks such as those associated with cross-pollination.

In Colorado, the vast majority of industrial hemp cultivation is for CBD or other cannabinoid production. As an early mover, Colorado may have an advantage in cannabinoid production, but the state needs to consider whether other industrial hemp applications would be profitable for producers in the state. As the industry grows, hemp production for fiber and oil seeds or dual purposes may increase, but the supply chain will need to grow alongside increased cultivation. The supply chain is immature, but there is potential interest in industrial hemp materials in transportation and construction for example by auto manufacturers for vehicle interiors or by major home building and aerospace manufacturing corporations.

Research and development by major end-users or by materials manufacturers are still necessary to determine if hemp-based materials are an advantageous alternative to current materials. Given Colorado's history of hemp cultivation, the state could attract a major decortication facility or other mid-stream manufacturing plants if demand for industrial hemp products materializes.

The lack of reliable information on hemp marketing channels and other hemp-related data will continue to improve; providing valuable information as this emerging industry grows. While we have current information on registered hemp processing and manufacturing businesses, in the future the compilation of further data on processors and manufacturers that produce non-industrial items like textiles or building materials (that do not fall under CDPHE's purview) will be helpful in informing the industry.

While farms are experiencing a frictional oversupply due to a fragmented market, consumers are looking for new food and dietary supplement alternatives; and businesses are looking for sustainable and renewable energy and building materials. Despite the recent challenges on the supply side, there is undeniable potential for growth in demand for industrial and consumer hemp products in the U.S. As the entire industrial hemp supply chain grows and matures, Colorado is poised to take advantage of this growth in demand if it materializes. For this growth in demand to occur the industry needs to be proactive about addressing quality issues, unproven medical efficacy claims, and the accuracy of dosing. It is imperative that Colorado explores any potential opportunity and develops the supply chain for the emergence of industrial hemp for textiles, polymers, and building materials.

Overall, there is a lack of consumer education around cannabinoids, which is exacerbated by the lack of Federal regulations related to cannabinoids in consumer products. On the industrial side, there is a lack of applied research and proven cost-effective use cases for different hemp applications.

Colorado can continue to lead the industry in hemp innovation by facilitating and maintaining a favorable regulatory environment for research and development. The recommendations outlined in this CHAMP document demonstrate that the Colorado hemp industry is eager to position the state to be a production and manufacturing leader.

To achieve leading status, research and development will be needed in several areas including (1) plant genetics; (2) effective uses for a variety of hemp industrial applications; (3) consumer uses and preferences for cannabinoid products; and (4) scalable and safe manufacturing practices.

Notes

A Partnership of the Colorado Departments of Agriculture, Public Health & Environment, Regulatory Agencies, and Office of Economic Development and International Trade.

The CHAIR. Thank you very much.

At this time, I want to welcome the Ranking Member, Mr. Thompson, and allow him the opportunity for 5 minutes for any opening statement he would like to make.

OPENING STATEMENT OF HON. GLENN THOMPSON, A REPRESENTATIVE IN CONGRESS FROM PENNSYLVANIA

Mr. THOMPSON. Well, good morning, and thank you, Madam Chair and Ranking Member Baird, for holding today's hearing and to the witnesses for being here, much, much appreciated. I think this is our first hearing on this commodity, which is amazing, given the work that we did laying the foundation in the 2014 and 2018 Farm Bills, so long overdue, and thank you to both of you for your leadership on this.

While I am excited to hear from such a distinguished group of witnesses, I am disappointed we are having another hearing where USDA—and in this case the FDA too—are missing in action, absent without leave, from the discussion. I think everyone in attendance would have welcomed to hear their perspectives as a part of this hearing.

These two agencies have an integral role related to both regulation and oversight of the hemp program, and without them, we are missing a piece of the puzzle on an issue that has never once been publicly discussed by this Committee. And I hope we can rectify that in the remaining months of Congress, especially given the testimony. And thank you for your testimony, all five of you, and specifically where you noted the frustration of waiting for the FDA in particular.

As we all know, there was a lot of excitement—I witnessed it firsthand—and trepidation surrounding hemp following the passage of the 2018 Farm Bill. However, after the first growing season, many producers were left with hemp in the field and had no markets to sell their products to. And since the 2019 growing season, there has been a significant decrease in the number of acres planted. At the same time, though, we have seen continued investments in using hemp fiber for a variety of industrial products. I think it really is reflected in American agriculture innovation, not just in the practice, but identifying uses for this commodity.

The investments have been made in using hemp fiber for a variety of industrial products. Now, I am excited to learn more from our witnesses today and have appreciated hearing that, about the innovative work that is being done. These conversations are important to our oversight mandate, so I look forward to the Q&A part of this hearing to continue to gain perspective on what worked and what didn't work and learn more about what stakeholders are thinking as we approach the reauthorization for the 2023 Farm Bill. I do appreciate all the recommendations and thoughts in your oral testimony and your written testimony. I once again want to thank our panel for taking time to be with us today.

And with that, Madam Chair, I yield back.

The CHAIR. Thank you very much to the Ranking Member of the full Committee. I appreciate your opening statement and your comments during this time.

I wanted to at this time begin the questioning. At this time, Members are recognized for questions in order of seniority, alternating between Majority and Minority Members. You will be recognized for 5 minutes each in order to allow us to get to as many questions as possible. Please keep your microphones muted until you are recognized in order to minimize background noise. I recognize myself for 5 minutes.

And I first want to thank all of the witnesses for their testimony and for being with us.

Commissioner Quarles, in your article, *Hemp, Kentucky, and the Law,* you discuss the economic opportunities of hemp, but also the challenges. Could you outline some of the complexities that arose after the 2018 Farm Bill? Has the USDA Final Rule helped to clarify things for states, Tribes, and other producers?

Dr. QUARLES. Thank you so much for that question, Chair Plaskett. The biggest issue before 2018 for industrial hemp was obviously the Federal prohibition, classifying it as a controlled substance. And so after the 2018 Farm Bill was passed, other issues emerged as, say, speed bumps, I guess you could say, for the progress of hemp legalization. These were a half dozen issues or so ranking from problems with the banking industry, with interstate travel or transportation of hemp material seeds, seedlings, *et cetera.* We also saw issues where there was some confusion from law enforcement, as well as the need for us to have standardized and uniform testing across the country.

And so I know that USDA at the time inherited a monumental task with legalizing hemp through regulation, and we knew that the interim rule findings would need to be adjusted into the final rule as well. I think that the USDA deserves accolades for the progress that they have made. They have separated out the production of hemp *versus* the legal products, but there are still a lot of issues that I think need to be addressed in the 2023 Farm Bill. For instance, I think that the lot program at USDA, there is a lot of confusion. There is a lot of issues between the state regulators, as well as the reporting guidelines with the FSA. And I would agree with Commissioner Greenberg that this might be an opportunity for us to look for those states that elect to have hemp programs to have a cooperative federalism program with funding attached because what we are seeing right now is that some states may not want to continue underneath the USDA program and leave it to USDA and not let the states regulate.

And the final issue that I have is that we need to make sure we have a productive conversation with FDA so that they can give us clear guidance, particularly on what to do with floral products that derive from hemp.

The CHAIR. Thank you.

Dr. QUARLES. We have a lot of companies that want to sell these products. We just need guidance from the FDA. Thank you.

The CHAIR. Thank you. And Commissioner Greenberg, how have the markets for hemp in the U.S. developed and fluctuated since Congress passed the 2018 Farm Bill? What is needed to provide certainty and stability across the market for farmers, producers, and consumers of hemp?

Ms. GREENBERG. Thank you for the question, Chair Plaskett. It is an excellent question and one we are very much focused on in Colorado. I mentioned market diversification and how important that is to a thriving hemp economy. Immediately after the 2018 Farm Bill, as I mentioned, we saw a very narrow market opportunity for our producers, which was strictly around CBD. But since then, we have seen much growth around a much more diversified industry for hemp. That includes fiber, food, fuel, and other products like you have heard about today that we are looking into and seeing progress on.

I would say one barrier that we are intimately focused on and familiar with in Colorado is the gaps and limits in our supply chain primarily around processing and manufacturing here in this country, so that is a place that we are very much focused on. I think we have a lot of production capacity and incredible farmers who

are able to grow fantastic crops. We need to make sure every step along the supply chain across these market opportunities are strengthened and grown.

The CHAIR. Thank you. I guess one of my other questions is how do—and this is for any of the witnesses. How do you suggest increasing socially disadvantaged farmers' involvement in the hemp production? This seems to be a market where those who are already up and running farming know the process, know how to get things to market are the most successful. How do we get socially disadvantaged farmers involved in this?

Dr. PHIPPS. Thank you for that question, Chair Plaskett. As an 1890 institution, we were clearly founded to address issues like that. So like all of the other land-grant institutions, while we serve the tripartite mission of education, outreach, and research, we have an added layer of making sure that we are targeting the most disadvantaged members of our society, including farmers, community members, *et cetera.* So I think the USDA has already made great strides, and I do want to give them accolades for the programs that they have put into place for Tribal communities, as well as historically Black colleges and universities, and for Black and other minority farmers.

I think that projects similar to the one that I am running that I have mentioned, the SUSHI Project where we actually partner with all three types of land-grant institutions, so we have 1890s, Central State, and Kentucky State. We have College of Menominee Nation that Marcus has already mentioned, and we have three 1862s. I think encouraging those sorts of transdisciplinary, multi-institutional research projects and outreach projects would be helpful.

The CHAIR. Thank you. Thank you very much.

At this time, I would ask the Ranking Member to begin questioning the witnesses for his 5 minutes.

Mr. BAIRD. Thank you, Madam Chair. I am going to begin with the question to Dr. Phipps. In your testimony you mentioned your role as the project director for a grant from Agricultural Food and Research Initiative, Sustainable Agriculture Systems, and it is a grant that includes researchers from six different land-grant institutions. So could you talk a little more about the importance of these competitive grants, the lessons that we have learned going through the application process, and how a multiple-institution project may have benefited your application?

Dr. PHIPPS. Absolutely. So we are still in the early stages of this project. We are finishing up year 1 of a 5 year project, but we have already seen the benefits of having, again, integrated, transdisciplinary, and multi-institution focus in the project. And so, like I mentioned, we have Central State University, we have Kentucky State University, we have College of Menominee Nation, we have University of Kentucky, which has already been spoken about here. Tyler Mark is an economist there. We have Mississippi State University. We have an environmental economist on our team from there and a University of Delaware consumer economist.

I would say that, as I mentioned in my opening, I think that in order to adequately address these complex issues that we are dealing with, you need to have people that are working from all dif-

ferent sides of the issue, so you need your economists, you need your social scientists, you need Tribal representatives, you need people that are focused on equity and nutrition and health. You need fish nutritionists. You need hemp or whatever crop you are working with experts to be able to touch on all of the aspects that are going to make the project successful and provide the wealth of information that is needed for policymakers and for consumers ultimately to make decisions regarding a project.

And so, again, I think that the Sustainable Agriculture Systems Program within USDA, it is currently their flagship program, up to $10 million, has done an excellent job of making sure that they are addressing those complex issues in ways that are going to be sustainable and valuable answers for the long-term. And I think that more projects that have those kinds of requirements and those kinds of partnerships are going to be key to continuing to move forward in whether we are talking about hemp or any other commodity crop or agricultural issue. Thank you.

Mr. BAIRD. Thank you. I really appreciate the work you are doing at Central State University. I would also like to recognize other land-grant universities that are doing great research in the hemp industry, which includes, as you mentioned the University of Kentucky, which was one of my alma maters, and they are not represented here today on this panel, but they have prepared a written testimony. So Madam Chair, with your permission, I would like to submit their statement for the record.

The CHAIR. It is very welcome, and without objection.

[The joint statement is located on p. 141.]

Mr. BAIRD. So then I have one more question. Mr. Wang, you spent several years in Australia before joining Ecofibre. And while Ecofibre recently entered the U.S. market, you mentioned they have been in operation in Australia since 1999. So could you share some of the differences between what is going on in Australia and what you see here in the U.S. and what this Committee might learn to incorporate in our 2023 Farm Bill?

Mr. WANG. Yes, sure. Thank you for the question, Mr. Baird. So Ecofibre started, as I mentioned, in 1999 primarily as a genetics company collecting a range of genetics from across the world for hemp or cannabis at the time, and a lot of work done by Ecofibre was to set up a genetic pool for the research to be done. So today, we have about 2,100 different accessions of hemp genetics. And the work done for the first 15 years was really about growing hemp in the latitudes of Australia, which actually matched the latitudes of the United States, which is quite important because I think while people think it is easy to grow, it actually it is a bit harder, and genetics is at the core of that. So that is what the company had done for about 15 years.

The work done over there was brought over to the U.S. mainly because of the market size and opportunity in the U.S. And, listen I think the U.S. with the farm bill in 2018 has probably a better structure in my opinion. In Australia right now hemp is regulated by three different agencies. For food, there is something called FSANZ (Food Standards Australia New Zealand), for medicinal purposes it is the Therapeutic Goods Administration, and for fiber it is actually the Department of Primary Industries. So for me, it

is a lot of work managing three different regulators for a single crop.

The United States, like I said, has done it in a different manner. So you came from a crop down, which I think is far superior. I think a lot of the challenges we have, while they seem significant or not, it is just a bit of clarity required for one specific segment. I think for food and for industrial uses, the U.S., we are very well set up for that. The challenges just become of—I always come from consumer or manufacturing background. They want to know the supply chain exists. Anyone of any size company who is going to use hemp, whether it be in car doors or building supplies, wants to know if they introduce a product to the market, they will have a controlled supply chain that will be there, and that is a big gap that we have today.

Mr. BAIRD. Thank you very much. I am out of time. I would——

The CHAIR. Thank you.

Mr. BAIRD. I could spend another hour——

The CHAIR. Yes.

Mr. BAIRD.—asking—oh, you are going to say no. Okay. Thank you.

The CHAIR. Thank you. I will just remind the witnesses, too, as you are answering questions, please be mindful of the time so that we can get all of the questions of the Members.

I would now like to call on the gentlewoman from Ohio, Ms. Brown, for her 5 minutes.

Ms. BROWN. Thank you, Chair Plaskett and Ranking Member Baird, for holding this hearing today.

The 2018 Farm Bill legalized the production of hemp and opened the door for creativity and opportunity for both growers and processors. In the years since the last farm bill, we have seen firsthand the importance of strong interagency communication and coordination, especially as it pertains to hemp production. For example, the USDA requires any laboratory testing hemp for the THC compliance to be registered with the Drug Enforcement Agency.

Mr. Grignon, what are the impacts you have seen in certain areas of the country where there is no access to DEA-approved laboratory?

Mr. GRIGNON. Well, I think some of the issues that we are running into is because there are only a few registered DEA labs, a lot of the THC testing is only in certain areas, so you have to literally wait. So you have to take the time to cut your samples or have your samples be cut, and they have to be processed and shipped over to the lab. Now, if there is not a lab in your state, you have to wait and go—basically a few states over, so there is basically a lack of testing capacity in our country right now to handle the hemp industry if we were to start to expand more.

Ms. BROWN. Thank you, Mr. Grignon. A streamlined approach obviously to regulating hemp products is critical. So, Dr. Phipps, can you speak to some of the complexities that arose after the 2018 Farm Bill as it pertains to the regulation of hemp and hemp-derived products?

Dr. PHIPPS. Thank you for that question, Representative Brown. As you know, my background is primarily in how hemp can affect human nutrition, and so I would say that I can speak to the regula-

tions affecting hemp as animal feed. And so we know that there has been a lot of difficulty in getting FDA approval of hemp as an animal feed. We know that there was a chicken application that went in. It came back with some feedback. I would say that one of the most difficult issues with that is it is costly and it is very unwieldy, the system, currently as it is. And so a possible solution to that could be infusing dollars into the FDA CVM in particular to streamline that process. Perhaps looking at what is being done in the European Union right now where they have hemp already approved in a variety of forms as animal feed and perhaps using that as a starting point in determining how we can streamline our processes.

I would yield my time to anybody on the panel that can speak to some of the other complexities related to fiber and other parts of the process.

Ms. BROWN. Well, before you do that, I would just respectfully reclaim my time. I know that you, Dr. Phipps, have a very exciting project that was recently awarded, $10 million in funding from the National Institute of Food and Agriculture. And in your written testimony, you talk about the lack of consumer awareness around nutrient benefits of hemp products. How can the USDA and FDA do a better job of educating consumers in this space?

Dr. PHIPPS. Sure. So we have an entire section of NIFA that is based on outreach and extension in the land-grants and through other projects. I would say, again, continuing to fund land-grant institutions who have a specific mission to providing that kind of education and outreach. There is work being done already, again, a partnership between the University of Delaware and University of Kentucky looking at what consumer knowledge currently is related to hemp *versus* marijuana, what are the nutrient values of hemp grain both from human consumption, as well as how they can benefit the food supply related to animal production. I would say continued funding into those areas, curriculum building from K–12 that can address some of these issues, that is another way that we can slow the rise of chronic disease in this country is to make sure that we start educating our young folks into ways that they can change their diets and their families' diets to be healthy. Thank you.

Ms. BROWN. Well, thank you, Dr. Phipps. I look forward to hearing from and hearing and working with my colleagues to strengthen the hemp production in the next farm bill. So thank you, Madam Chair. With that, I yield back.

[Mr. Grignon's supplementary information is located on p. 144.]

The CHAIR. Thank you very much to the gentlewoman from Ohio.

And at this time, I call on the Ranking Member of the full Committee on Agriculture, Mr. Thompson, for his 5 minutes.

Mr. THOMPSON. Madam Chair, thank you so much, and thank you to all the panelists once again for your testimony.

Mr. Wang, over the last 18 months my colleagues and I have been championing conservative natural climate solutions to help address climate change. We know our producers are part of that solution, a big part of that solution and not part of the problem. That being said, I am particularly interested in the work that Ecofibre

is doing to make hemp a natural climate solution, particularly surrounding Hemp Black. Can you talk more about this work?

Mr. WANG. Yes, thank you, Mr. Thompson, and thank you for that question. What we have been working on is—so when you start from the core part of the plant, we know it is carbon negative, it is one of the largest carbon sequesters, so I won't go into that topic. But of the plant, a large part of the fibers being used already for many different uses, and that makes up about 25 to 30 percent of the plant, which leaves a vast majority of the plant, the stalk, unused. And it is being used for a lot of lower-quality, low-grade uses such as plant bedding or animal bedding.

So what the stalk has is a very high amount of carbon in it. And so we went through a lot of research and developed a carbonization process to actually create an equivalent of carbon black. And so for everything that is black or colored black in the world, right now, it is typically used by carbon black, which is the incomplete combustion of petroleum, which is a carbon-positive input. So the Hemp Black that we create with the hemp-based carbon is 100 percent biobased, as tested by the USDA as part of the BioPreferred Program. And it is a highly carbon-negative input. And so that input is carbon black, which can be used in bioplastics, it can be used in rubber, it can be used as a colorant in textiles or as an ink or a coating right now. So our focus right now is using it to make a lot of different plastic products, 25 percent biobased, everywhere from simple black shipping pallets, which is a big movement to shipping pallets to do that to black plastics used in agricultural purposes or construction purposes, to use it as the dyes as opposed to carbon black for something as simple as jeans that are black on that. So what we are really doing is finding a one-for-one replacement for an existing supply chain material that is used significantly across the world, and it is petroleum-based, and replacing with something that is plant-based, which is hemp.

So there is a pretty significant net carbon effect. And we use the term *think negative* because while the world wants to get to net-zero, most everything is carbon-positive, so you got to have something negative to get there. And the beauty of hemp is there are so many different uses of hemp that I only am covering sort of very narrow pathway to that. But because it is such a flexible crop to be used for so many different uses, you can actually have the growing being negative and actually permanently sequester carbon while you are doing it. And for us, the biggest thing is it has to be a one-for-one supply chain replacement because I would not expect manufacturers downstream to invest significant amounts of capital just because we want to put hemp into it. Number two, it has to be equal technical specs, which it is. And three, we have to make sure it is cost equal to or better than, and in due course with scale, I would assume that a petroleum-based carbon black/gray, hemp-based carbon black, we can get the hemp-based carbon black equal to or better on a cost structure than petroleum.

Mr. THOMPSON. All right. Good. Well, thank you.

Would other witnesses like to comment on how hemp can be used as a natural climate solution? Go ahead.

[Mr. Grignon's supplementary information is located on p. 144.]

Ms. GREENBERG. Yes, thank you, Representative, for the question. I think what Mr. Wang next to me described is very much how Colorado is thinking about the opportunities with regards to hemp. We are very focused on climate mitigation and the leadership role agriculture can play in solving our climate challenges that we have before us now. Hemp is a big part of that solution. I think we have a lot of opportunities, again, looking across diversifying supply chains, investing in the processing and manufacturing, and then going back to the farm and making sure our farmers have support around climate-smart agricultural production, to make sure we are looking at soil, water, and climate altogether and the markets that combine those things into a sustainable marketplace for our producers. Thank you.

Mr. THOMPSON. Excellent. Any other witnesses care to comment on that?

Mr. WANG. I just might add one more Mr. Thompson.

Mr. THOMPSON. Please.

Mr. WANG. The one thing that we are working on as well is mine site remediation because there is a lot of soil, as you know what happens on mine sites, and hemp is actually a phenomenal remediator of soil to bring it back to life again by putting the nutrients back in. So, from a soil standpoint, that has a significant opportunity for that.

Mr. THOMPSON. Having represented now for some time the Pennsylvania 15th, it was the 5th district before that, but it is the district that has more abandoned mine sites than the other 434 districts added together, so that is that is a very exciting innovation you shared this morning.

So thank you to all our witnesses. Madam Chair, thank you.

The CHAIR. Thank you to the Ranking Member.

At this time, I would like to recognize the gentlewoman from Maine, Ms. Pingree, for 5 minutes.

Ms. PINGREE. Thank you very much, Madam Chair. Thank you for holding this hearing and thank you to you and the Ranking Member for your concerns about the challenges that growers in states are facing in growing hemp, which is a promising crop, and we have a long ways to go before we have smoothed out all the issues.

I think someone earlier mentioned my bill, the Hemp Advancement Act (H.R. 6645), and some of the problems I am going to bring up this morning I am trying to solve in that bill. But I want to discuss one in particular that seems frustrating. The existing DEA lab testing requirements plus the 10 year ban on people with drug-related felony convictions receiving a hemp license basically treat hemp like a schedule I drug, which is ridiculous in my mind. And I have talked to some producers in Maine who have problems—where their employees are struggling to get fingerprints that are acceptable by the FBI for criminal history reports. One grower told us that it had to be printed five times before it finally worked. We have only one Post Office that does fingerprinting, which is in Portland, Maine. I can't make appointments there. The State Bureau of Identification does fingerprinting there in Augusta. We have a big rural state. We have growers all over the state. So I am just talking about some of the complications.

My bill would remove this unjust 10 year ban and also removes the requirement about hemp testing be done in DEA labs, which I think has already come up.

But, Ms. Greenberg, thank you for the work that you are doing in Colorado. Have growers in your state run into similar issues? And could you speak to how eliminating the DEA lab testing requirement plus this 10 year conviction ban could help our hemp growers?

Ms. GREENBERG. Absolutely. Thank you, Representative Pingree, and excellent questions. On the first question, the DEA labs, as I mentioned in my testimony earlier, this has been a big barrier for us. We have a state-of-the-art brand-new laboratory at our headquarters in Colorado. We have fantastic scientists, experts in their field. We are a state that has been regulating both marijuana and hemp successfully for many years and doing so separately and able to manage that through our labs across the state. So the fact that we are now 3 years into navigating our requests for certification with DEA and still have yet to receive it with almost a decade track record of success to us indicates that that is excessive in the regulatory structure and not necessary to creating a safe and reliable regulatory framework for regulating hemp in our states.

On the second question on the 10 year ban, as I mentioned earlier, we feel strongly that hemp is a commodity crop. It is legal to produce and that we should not be criminalizing or intending to criminalize producers for producing a legal crop. I think with that framework that 10 year ban is something we would absolutely be interested in looking at. We are doing quite a lot of equity work as well throughout our state and making sure that folks who have not had access to producing for one reason or another have access to that now. Now that hemp is legal, it is a legal crop, and we want to make sure that we maintain that—within our regulatory structure as well.

Ms. PINGREE. Thank you. Thank you for the work you are doing, and thank you.

The other thing that we are working on in the Hemp Advancement Act is to raise the level of THC threshold for hemp and the in-process hemp extract to make the rules more workable for growers and processors, also ensuring that final hemp products sold to consumers aren't intoxicating.

Mr. Quarles and Ms. Greenberg, can you talk about producers that have had to destroy their entire crop due to the current THC threshold and how raising the threshold could help growers and processors, also has caused—unnecessary hardship to growers?

Dr. QUARLES. Yes, thank you for that question. Since the early days of bringing it back almost a decade ago, we have had to deal with what we commonly term *hot hemp,* hemp that exceeds the legal definition. And so we have had a struggle to determine how to do that both under the 2014 Farm Bill underneath the research side, and then again after 2018. And even today, with almost a decade of improved genetics, we still find varieties that consistently test hot. So one of the things we do is that we actually prohibit varieties that we know will test hot, and we don't consider it to be hemp, and so we try to prevent and mitigate on the front end. And then on the back end, if a crop were to exceed the 3/10 of 1 percent

threshold, we actually have an opportunity to retest that crop as well. And during the interim final rule, we advocated strongly that USDA allow growers to have a second testing opportunity, which they did include in the final rule. So that helps us out a little bit as well.

For your question about raising THC, we at NASDA actually passed a policy on behalf of all the State Departments of Agriculture a couple of years ago that would advocate for an increase to one percent THC. We think that after a lot of conversations with law enforcement, as well as those on the ground producing the crop and in the labs testing it, that raising it to one percent would allow for us to have a little bit more flexibility, particularly on the research of genetics.

Ms. PINGREE. Thank you so much. I am out of time, but I want to thank the witnesses for your time today and the work that you are doing. Thanks so much.

I yield back, Madam Chair.

The CHAIR. Thank you very much. At this time, I would like to yield 5 minutes to Mr. Carbajal of California if he is available. Are you there Mr. Carbajal? You may begin. You are muted.

Mr. CARBAJAL. Thank you, Madam Chairman, and sorry about my delay. Thank you to all the witnesses that have joined us today.

We have made tremendous strides in the 2018 Farm Bill when hemp was legalized. I know the Agriculture Committee doesn't have jurisdiction over de-scheduling cannabis, but I hope that once we are able to work through that, this Committee can work to recognize cannabis as an agricultural product as well. Cannabis is already legal in California and several other states. Legalizing hemp has allowed this industry to start flourishing, as hemp can be used in a variety of products from CBD to clothing to food. This is a versatile product that has benefits for consumers and the economy. In this next farm bill, I hope we can continue finding ways to bolster research and production.

Commissioner Greenberg, the decrease in registered hemp acres in Colorado from 2020 to 2022 is significant, falling from nearly 90,000 to less than 4,000. You note this is due to many factors, including supply chain disruptions, a surplus, the lack of infrastructure for food and fiber production from hemp. Have other crops been grown on this acreage that is not currently producing hemp? Which of these factors do you most attribute to the decline in registered acreage, and how can Congress help alleviate this?

Ms. GREENBERG. Thank you, Representative, for the question. The production in 2019 looked a lot different depending on where you were in the state. There were some existing farmers who were trying out hemp production as part of a much larger production and other commodities or other crops. There were other producers who came in who were maybe first-time hemp growers who put everything into a hemp business and rolled the dice on the 2019 market. So it really depends in terms of kind of which entry point a producer came in, in 2019, what that land is being used for now. We certainly continue to see plenty of land under production with other crops that was in hemp production in 2019.

So, I think the primary driver of that sort of rise and fall within the course of a single season was sort of the fury or the fervor

around the hemp production opportunities within that year, just tons of untapped opportunity, a lot of folks coming in at once, an unregulated marketplace, and a lack of diversity in market opportunities.

So where I see us now, I think we are in a much more stable growth position. I think we have probably stabilized to a place that is more manageable based on just the maturity of markets. Right now, we are in a nascent phase of this industry, and I think as markets mature as we get more stable regulatory environments and we build up the supply chain processing and manufacturing opportunities, and then as we have discussed, look at those environmental opportunities as well where our hemp producers can tie in to climate markets or other marketplaces that are driving toward a carbon-neutral future, as all of those aspects develop, I think we are going to see a steady rise back toward production but in a more sustainable rate.

Mr. CARBAJAL. Thank you for that very thorough answer.

Dr. Phipps, in your testimony, you talked about a lack of incentives for hemp growers to partner with domestic buyers and processors. What kind of incentives would be helpful? Do you see Congress facilitating this connection? If so, what should that look like?

Dr. PHIPPS. Thank you for your question. So yes, in my testimony, I mentioned that one of the stakeholder concerns that we see is a lack of incentives for growers to partner with producers. So, as has been spoken about previously, at the very beginning, there was a sharp rise in production of hemp and many growers were counting on partnerships with processors to be able to process their products. And so I think that if we can incentivize, as we fund processors to build infrastructure, we provide funding within that, that they can set aside to recruit growers and pay growers for their products. When that happens, we can build the network at the same time.

Mr. CARBAJAL. Thank you very much. Madam Chair, I yield back.

The CHAIR. Thank you very much to Mr. Carbajal. Thank you for your testimony.

At this time, I would like to call the gentleman from Florida, Mr. "Big Al" Lawson.

Mr. LAWSON. Thank you, Madam Chair. Can you hear me?

The CHAIR. I can hear you loud and clear, sir.

Mr. LAWSON. Okay, thank you. And welcome to the Members that are on this Committee today and before the Committee, and also give an honor to our Ranking Member, Congressman Baird, for this hearing that we have today.

Many of the witnesses today mentioned massive financial barriers when entering the industrial hemp market, including the registration and testing fees and background checks. So this question is for Dr. Phipps. Can you speak more on to what are some of the effects within the land-grant university system, cooperative extension services that provide technical and financial assistance to historically underserved agriculture products, include new and beginning and small size businesses, veteran-owned and socially disadvantaged farmers and ranchers based on race and gender?

Dr. PHIPPS. Thank you for that question. And as I mentioned earlier, the 1890 land-grants were specifically founded to make sure that we are equitably financing, educating producers, farmers, and consumers from underprivileged backgrounds. As a matter of fact, one of the other projects that I am working on is designed to grow healthy communities by touching on all aspects of the social determinants of health, so that includes building micro-incubator farms in low-access areas. It would include training in community and economic development and business development for those small farmers and helping them to get their products out into the value chain, and then also educating consumers in that area of the benefits of purchasing those items from those local farmers that are being developed.

I think that if we can continue that work, certainly, we need to make sure that we are providing opportunities for farmers and producers and processors from historically disadvantaged communities to have access to funding in order to build infrastructure. In the past, there hasn't necessarily been equitable access to those competitive grants. We know that both colleges that serve historically disadvantaged communities, as well as producers and farmers, from disadvantaged communities, may not have professional grant writers. They may not have the ability or the infrastructure set up to be able to competitively apply for those grants. And so providing opportunities for that, whether that is earmarked funds specifically dedicated to them or whether that is providing assistance in the process of applying for and receiving those fundings and implementing those particular programs would be helpful.

Mr. LAWSON. Dr. Phipps, there was just one other thing that I will ask you. I am concerned about gender, especially for women. Have all of this industry development and STEM affected women who wanted to enter in this process of hemp development, especially in what I see is happening in the State of Florida?

Dr. PHIPPS. So I can't speak to the State of Florida. I am in the State of Ohio. But I can speak as a woman who is in the field of agriculture and STEM. And you are correct. Historically, the fields of agriculture and STEM have been very dominated by men, dominated by White men. And even in the SUSHI Project that I am leading, there has been 32 that have been funded. These are those flagship programs of the USDA. Out of those 32, there have been only eight women that are lead on the projects. When we start layering on the additional things on top of gender such as race or ethnicity, we start to see that there is a significant under-representation of women receiving funding, of women farmers, Black women farmers, Brown women farmers that are entering the field. I certainly think that a review of funding processes of the way that we are recruiting, targeting recruitment of those individuals so that we can, I would say, bring back because women and women of color have always been involved in agriculture. They have always had a hand in growing the crops that feed their families and their communities. And so I think that targeted recruitment and targeted outreach and targeted funding to bring women, especially women of color, back into a typically otherwise dominated agriculture and STEM field is needed and important. And I thank you for the question.

Mr. LAWSON. Okay, thank you very much, Dr. Phipps, and it was very good what you said about gender, which is very important to me.

Madam Chair, I am going to have to leave and go to Financial Services, but this is really a great hearing. I would like to follow-up with Dr. Phipps on some other issues that are related to gender. Thank you.

The CHAIR. Thank you. Thank you very much for your insightful questions.

As we close, I would like to first invite the Ranking Member to share any closing comments he may have.

Mr. BAIRD. Thank you, Madam Chair. And I will make it very quick because we have votes, I recognize. But, we have heard a lot of great recommendations for the 2023 Farm Bill here today, and one that I would like to add is that the FDA hasn't really had any kind of regulatory framework for hemp-derived CBD, so I would encourage us to include that in our discussions about the 2023 Farm Bill. And I thank you. I yield back.

The CHAIR. Thank you, and I agree wholeheartedly with that assessment.

As we close, I would like to first thank all our witnesses for their insightful testimony and their answers to our questions. Your expertise and knowledge are crucial for ensuring that the next farm bill does all it can to support producers and ensure the long-term success of the domestic hemp industry.

Today, we heard an update from several stakeholders on the current state of hemp production. We also heard about what has worked for the USDA Domestic Hemp Production Program, and more importantly, what has not worked and needs improvement. I am personally excited to continue to work with our panel of witnesses and the producers they represent, as well as Members of our Committee, to make sure farmers have the tools, guidance, and assistance they need to support their businesses in their communities, as well as now understanding the processors and others in the supply chain as well.

I would like to again thank our witnesses for being here today, as well as all our Members for giving this important topic the attention it deserves.

Under the Rules of the Committee, the record of today's hearing will remain open for 10 calendar days to receive additional material and supplementary written responses from the witnesses to any questions posed by a Member.

This hearing of the Subcommittee on Biotechnology, Horticulture, and Research is adjourned.

[Whereupon, at 11:21 a.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

SUBMITTED JOINT STATEMENT BY HON. JAMES R. BAIRD, A REPRESENTATIVE IN CONGRESS FROM INDIANA; ON BEHALF OF ROBERT "BOB" PEARCE, PH.D., PROFESSOR OF AGRONOMY, DEPARTMENT OF PLANT AND SOIL SCIENCES; AND TYLER B. MARK, PH.D., ASSISTANT PROFESSOR, DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY OF KENTUCKY

[Chair] Plaskett, thank you for the invitation and opportunity to provide written testimony to the Biotechnology, Horticulture, and Research Subcommittee of the House Committee on Agriculture. We represent the University of Kentucky (UK), 6th Kentucky Congressional District.

Dr. Pearce is an Extension Professor in the Department of Plant and Soil Sciences and Interim Director of the University of Kentucky Hemp Program. He has been working on hemp best management practices since 2016. He leads the national hemp grain and fiber variety trials for the S–1084: Industrial Hemp Production, Processing, and Marketing in the U.S. multi-state project and serves as the University of Kentucky representative on the FFAR Hemp Research Consortium. His research team has secured funding from USDA–ARS, NIFA, and multiple private companies.

Dr. Mark is an Associate Professor in the Department of Agricultural Economics. He has been working on hemp economics since 2014. His team at the University of Kentucky has been part of teams securing over $13.3 million in funding to evaluate all aspects of the hemp supply chain since 2014. These projects are funded through USDA–ARS, AMS, ERS, and NIFA. Specifically, with my collaborators, we are developing the first national estimates of production costs for hemp, evaluating and providing producers feedback on contract requirements, assessing the economic impact of hemp production, evaluating various pricing strategies, conducting market channel assessments, and evaluating the demand for hemp products.

Since the passage of the 2014 Farm Bill, much has been learned about the formation and accumulation of cannabinoids, including Tetrahydrocannabinol (THC), in *Cannabis sativa.* The total potential cannabinoids and the ratio between the many different cannabinoids are primarily determined by genetics. Plants expressing THC synthase genes produce THC predominantly and would typically be classified as marijuana. Plants that do not express THC synthase genes produce mostly other cannabinoids but often still produce small amounts of THC due to the non-specificity of other cannabinoid synthases. This can lead to these plants exceeding the current 0.3% THC threshold for hemp. The term cultivar describes a population of plants cultivated by selective breeding. In the aftermath of the 2014 Farm Bill, many cultivars available to growers were unstable (some still expressing THC synthase genes), leading to significant challenges for growers to produce compliant material. As the industry has developed, cultivars have begun to stabilize, making it possible for growers to manage cannabinoid levels better. However, a 0.3 percent limit on THC still presents some challenges for hemp growers and may limit the maximum concentration of cannabinoids such as CBD achievable while producing compliant material.

The primary argument for increasing the THC level to 1% is to reduce the incidence of non-[compliance] and allow more opportunities for hemp production. **Will increasing to 1% achieve this goal?** Potentially yes, but as with many policy changes, there will be winners and losers to this change. This testimony aims to outline key considerations for the Committee as they discuss increasing the THC level to 1%. However, it should be noted that the information provided is from preliminary studies in these areas. Additional funding is needed to explore further the full implications of transitioning the hemp industry to a 1% THC rule. Additional state level and national data are needed on the percentage of acres testing above 0.3% THC, market demand, and regulatory frameworks are needed to understand the full implications of this change.

Consideration 1: Acreage, Producers, and Processors

Increasing the THC limit to 1% will have implications across the hemp supply chain. *Figure 1* shows results from pre-harvest compliance tests for the state of Kentucky from 2018–2021. The percentage of samples testing above 1% in Kentucky has ranged between a low of 0.2% in 2018 and 2.0% in 2019 and 2020. Key contributors

to the differences between years are the hemp genetics planted and environmental factors (*e.g.,* precipitation, stress degree days, soil conditions).[1–2] *

Figure 1: Kentucky Pre-Harvest THC Results 2018–2021 [3]

Pre-Harvest THC Results	2018	2019	2020	2021
.300% or less	81.0%	57.0%	50.0%	57.1%
.301–.399%	14.0%	26.0%	22.0%	25.0%
0.400–0.999%	5.0%	15.0%	26.0%	17.2%
1%+	0.2%	2.0%	2.0%	0.7%
Total Tests	**100%**	**100%**	**100%**	**100%**

An increase in [allowable] THC levels would likely significantly decrease the number of acres and producers needed to meet the demand for floral hemp for cannabinoid production. Increasing the THC limit from 0.3% to 1% is a 233% increase in THC allowance. Considering only cannabidiol (CBD) production from floral hemp, this will significantly decrease the number of producers and licenses needed to support CBD demand in the United States. The ratio of CBD to THC is approximately 25 to 1 so increasing THC to 1% would allow CBD concentration levels increase from a current maximum of 7.5% to as much as 25% in floral biomass.[1] Reducing the number of producers will positively impact the processing sector. It will lower the processors' transaction costs primarily utilizing batch processing methods. Therefore, increasing the concentration of CBD going into the batch process will improve the processor's efficiency because they will need to source fewer pounds of floral material. In addition, processors will need to source floral material from a smaller number of producers, reducing their search costs for material.

For the hemp industry's grain and fiber sectors, the increase to 1% allowable THC would potentially lower the production cost for these producers by reducing the need for compliance testing. Thus, improving hemp grain and fiber profitability prospects and allowing for more competition with traditional commodities for acreage.[4] The increase in acreage would also be positive at the processing level through increased availability of grain and fiber lowering the processing costs for the sector over time as genetics and production practices improve through research.

Consideration 2: Is it 1% THC for floral material harvested or 1% for finished products?

The predominant hemp market is the production of floral hemp for the extraction of CBD, terpenes, and other extracts. These products are produced through their extraction from hemp flower. These cannabinoids, terpenes, and other extracts are concentrated during this process. So at the farmgate hemp will be 0.3% under current regulations but once extracted it can be concentrated up to the isolate level. Thus, consumers could be consuming levels of THC higher than 0.3%. As the Committee considers the 1% THC rule, there is a need to define if this is 1% THC in the biomass or 1% THC in the final product. These are significantly different regulations and will significantly impact the profitability and growth of the hemp industry. This line of research needs considerable research to evaluate the winners and losers depending on how an increase to 1% THC will impact the industry.

Consideration 3: International Trade

International trade is an important component of the United States agricultural sector. To expand the hemp industry, especially CBD, United States hemp producers must look to the international market. Yes, some countries, such as Uruguay, Argentina, Jamaica, and Portugal, have relaxed THC laws. Depending on their CBD laws, these are potential trading partners where the United States hemp producers could see expansion. On the other hand, Singapore, United Arab Emirates, Turkey, Saudi Arabia, and the Philippines have some of the strictest THC laws. Thus trading hemp products containing THC will be problematic for trade negotiations with

[1] Toth J.A., Stack G.M., Cala A.R., *et al., Development and validation of genetic markers for sex and cannabinoid chemotype in Cannabis sativa L.*† GCB BIOENERGY. 2020; 12:213222. *https://doi.org/10.1111/gcbb.12667*.

[*] Footnotes annotated with † are retained in Committee file.

[2] Jeong, Hoyeon & Appuhamilage, Buddhika Patalee Mallika & Mark, Tyler B., 2022. "The Estimation of Yield of Industrial Hemp in Kentucky Using Spatial Analysis,"† 2022 Annual Meeting, July 31–August 2, Anaheim, California 322308, Agricultural and Applied Economics Association.

[3] Kentucky Department of Agriculture Hemp Program 2021 THC Summary.

[4] *https://hemp.ca.uky.edu/*.

these countries and could impact current trade agreements. More research on the short- and long-term implications need to be evaluated.

Consideration 4: Hemp Market Confusion

Consumers of hemp products across the United States struggle to differentiate between hemp and marijuana as the market currently stands. Since February 2020 through AMS–TM–FSMIP–G–20–004 a monthly survey has been conducted to evaluate consumer attitudes and preferences for hemp-derived products. This survey is particularly relevant for the CBD industry but not the grain and fiber industries. The survey asks a series of questions about what word comes to mind when they hear hemp. Overwhelmingly the answers are marijuana and cannabis.[5] We also find that most consumers are more familiar with marijuana than hemp and that 40% of CBD consumers have euphoric effects. While CBD consumers should not have euphoric effects, this has been a consistent result within the survey. Thus, as a research team, we are working to find ways and funding to clearly provide the consumer education needed to differentiate hemp from marijuana. Increasing the allowable THC could have a negative impact on the industry as a whole and further confuse potential consumers. We are also finding that the confusion in the CBD industry is also impacting the grain and fiber industry as consumers don't understand the differences between hemp produced for the floral, grain, or fiber industries.

Another confusion exists with the emergence of Delta-8 THC in the marketplace. Delta-8 THC is a psychoactive drug that can be derived from hemp.[6] This is a direct competitor to Delta-9 THC. The Delta-8 market developed in response to lower demand for CBD than expected, excess supply floral biomass on the market that could be synthesized into Delta-8 THC, and the processors' need to find a product to provide cash flow as the wholesale price of CBD declined. USDA–FDA has provided consumer warnings about the use of Delta-8.[7]

Consideration 5: Company Investment

Since 2014 companies have been investing in hemp production and processing and have been working under the 0.3% THC rule. They have been investing in genetics and production practices to remain compliant with current regulations. They have constructed their business model, financing, and go-to-market strategies with the current regulatory framework. It is unknown at this point, how many companies will be impacted significantly if THC is increased to 1%, but it is likely the most dramatic impact will be on those companies and universities that have invested in the development of genetics to produce hemp varieties that produce less than 0.3% THC.

Conclusions

The production of hemp in the United States is in its infancy, minimal data exists, and regulatory certainty is needed if the hemp industry is to reach its full potential. As the Committee considers the implications of increasing the allowable THC level from 0.3% to 1%, a number of considerations need additional research and a coordinated effort through USDA and FDA to clearly understand how the industry will be impacted. However, preliminary research suggests:

- increasing allowable THC from 0.3% to 1% will require fewer acres and producers of floral hemp,
- increase the potential profitability of the floral hemp extraction industry through reduced extraction costs,
- decreased acres testing hot initially as hemp breeders adjust to 1% regulation within breeding programs,
- fiber and grain producers become more economically viable due to reduced testing costs,
- impact of increasing allowable THC to 1% for the plant material compared to the final product will have profoundly different impacts,
- international trade could be impacted either positively or negatively depending upon the trading partner and their laws,

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[5] *https://www.udel.edu/academics/colleges/canr/departments/applied-economics-and-statistics/affiliated-centers/hemp-demand-research/*.

[6] Melvin D. Livingston, Andrew Walker, Michael B. Cannell, and Matthew E. Rossheim, 2022: *Popularity of Delta-8 THC on the Internet Across U.S. States, 2021* AMERICAN JOURNAL OF PUBLIC HEALTH 112, 296–299, *https://doi.org/10.2105/AJPH.2021.306586*.

[7] *https://www.fda.gov/consumers/consumer-updates/5-things-know-about-delta-8-tetrahydrocannabinol-delta-8-thc.*†

- consumers are confused about the difference between hemp and marijuana as Delta-8 has put the two industries in direct competition,
- companies that have invested or have a business structure in place to adhere to the current regulatory framework will potentially be negatively impacted by a new regulatory environment.

SUPPLEMENTARY MATERIAL SUBMITTED BY MARCUS GRIGNON, EXECUTIVE DIRECTOR, HEMPSTEAD PROJECT HEART

Insert 1

Ms. BROWN. . . . I look forward to hearing from and hearing and working with my colleagues to strengthen the hemp production in the next farm bill. . . .

Since the 2018 Farm Bill, many of us in the American hemp industry from underserved communities were under the assumption with hemp production being legal under the Agricultural Marketing Act of 1046 we would have no more issues with legitimacy as an agricultural commodity. As an underserved hemp producer and the head of an organization that works with many underserved communities, I can attest the legalization of hemp has not been a clear path for many of us. We still face issues with banks, insurance companies, and local law enforcement agencies throughout the United States.

From my own experience, I have had issues with opening a bank account for my farming operation. I have been able to find a bank to work with me, but I am considered a medium risk bank account with restrictions. These restrictions are I must report ahead of any transactions going into my account to the President of the Bank. Further, I am not authorized to have any wire transfers going into and coming out of the bank account. While I accept the conditions for the bank account, I just want to be treated as any other farming entity that works with an agricultural commodity.

During the last 4 years of hemp being legal, it has been difficult to find capital to support my farming enterprise. As the issue previously noted affects not just banking but seeking capital. One avenue to solve this issue is the community development financial institutions (CDFIs). With a CDFI's assistance on the development of an agricultural lending product, underserved communities can secure capital for their farming enterprise. The United States Department of Agriculture can lend to underserved communities, but we need to be denied first by another financial institution before seeking assistance from the department. Funding for CDFI's to develop agricultural lending products for hemp production will help underserved communities secure capital.

When it comes to insurance, I have a difficult time finding an insurance company who will take my money and provide coverage for my business liability coverage. I have tried USAA and American Family Insurance. USAA will not work with hemp production companies and American Family Insurance has a structure for insurance coverage, but it mainly focuses on medical/recreational cannabis businesses. While I appreciate the structure American Family Insurance has for cannabis producers, it does not specify for hemp production, and I have had to explain none of the applications are applicable to my farming enterprise.

The other underserved communities Hempstead Project Heart works with nationally have expressed concerns with similar banking and insurance issues for their hemp producers. Further, the various 51 jurisdictions across all the states have different rules and regulations for hemp production. This causes a problem for many producers who want to transport their hemp products to another locality. In one state, the hemp product is accepted. In another state the hemp product is not accepted. It is important in the next 2023 Farm Bill a "stamp of approval" is created under USDA for all hemp products wherever they are produced in the U.S. are unhindered from being transported across state lines.

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Mr. THOMPSON. All right. Good. Well, thank you.

Would other witnesses like to comment on how hemp can be used as a natural climate solution? . . .

Industrial hemp is a bio accumulator and bioremediator for the land. The long tap roots of the hemp plant dig down into the soil and pulls the heavy metals from the soil. Currently, there are various companies throughout the United States in the hemp industry who remediate the land with hemp. That is the first action. The second action is the heavy metals and hydrocarbons that are in the soil accumulate

into the hemp fiber stalk. With these various chemicals and metals now inside the hemp plant, there is a process to turn these once land pollutants into fuel. There are various aerospace companies (*https://greenaero.org*) who work in the hemp industry on research and development currently able to create fuel from the remediated hemp fiber stalks. This fuel could be used for propane for heating or rocket fuel for space travel.

When you look at hemp as a carbon sequester tool, there's benefits to produce hemp to act as a carbon sink. I am not talking about carbon markets or cap and trade mechanisms. I am referring to the ability to produce hemp through regenerative agriculture and pull carbon from the atmosphere to sink said carbon in the soil. There has been research conducted over the past 4 years on this concept and Draw Down Hemp (*https://drawdownhemp.org/*) has quantified 16 individual hemp products, each with the potential to sequester and/or avoid anywhere from .1 to 1.5 gigatonnes of CO_2e per year at scale.

Further Material Submitted by Honovi Trudell, Support Staff for Hempstead Project

Hemp is the forefront solution to the world's most pressing 21st century problems. Climate change, sustainability, economic stability, clean energy production, hunger, and material shortages would all be addressed and solved by Industrial Hemp technology. The current identity of this crop has neglected to incorporate the scientific knowledge of Hemp to create real world products that better human and [E]arth-based life.

Hempstead Project Heart (Hempstead) will change that. This is a summary of various scientific studies conducted in various nations that consistently and unbiasedly proven the sustainability of this Industrial crop. This entry is focused on the Biofuel research conducted for Hempstead to immediately begin operations in the production of Industrial Hemp biofuel production for commercial purposes.

Biomass currently supplies about 12–13% of the global energy supply. This is without the use of Industrial Hemp. The use of Industrial Hemp as a biofuel will catapult the use Bioenergy production as its sustainability and economic benefits cannot be ignored.

The durability of Industrial Hemp; its ability to grow in multiple soil environments, ¾ of American mainland is suitable for its growth,[1] (albeit arctic regions) with minimum water requirements or nutritional inputs for its survival, (not optimal yields) make it a logical solution for sustainable energy production with worsening drought conditions. The use of Industrial Hemp will reverse negative climate effects through its un-paralleled carbon absorption rates. Studies have shown between 7–22 tons of $C0_2$ absorption per hectare of Hemp are regularly reported. The immediate use of Industrial Hemp is necessary to reverse the growing damage to [E]arth's atmosphere from other unsustainable practices. Furthermore, growing Industrial Hemp for fuel consumption on infertile grounds not only improves that soils health, but preserves the health of already fertile soil for food/material, which Industrial Hemp also produces.

The greater the biomass of the crop, the greater the yields. 12″ a week of growth have been regularly documented, annually reaching 16′.[2]* Our research over the past 3 years has shown with the right soil health, hemp fiber can grow 14′ tall in less than 60 days. The rapid growth of this crop acts as an immediate climate solution which allows preservation of forests and other endangered environments.

Biodiesel requires no modifications to existing diesel engines. The production of biodiesel through transesterification with vegetable/animal fat and alcohol produces a clean fuel which does not produce sulfuric acid as chemical diesel does. Industrial Hemp Biodiesel is clean fuel ready for use. Hemp requires minimal water, minimal fertilization, with few diseases that do not usually affect yields. Biodiesel yields from Hemp have been untapped because no organization has so far dedicated to obtaining true results. The conversion of *Cannabis Sativa* L. seed oil into biodiesel has a high rate of conversion that is greater than 99.5% with a total product yield of over 97%, making it extremely effective in preventing product loss to saponification as the biodiesel is created.[3]

Further, Sulfur ppm of Hemp is 0.4, compared to soybean 1.1 and rapeseed 2.4. Estimated calculation of Industrial Hemp puts fuel yields 207 gallons per acre to

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[1] F.F. Elliot. "Economics of Hemp." United States Department of Agriculture. Bureau of Agricultural Economics. (1941).

[2] Ahmad Alcheikh. "Advantages and Challenges of Hemp Biodiesel Production: A Comparison of Hemp *vs.* Other Crops Commonly used for biodiesel production." † University of Gavle. Gavle, Sweden. (2015).

* **Editor's note:** the master's thesis is retained in Committee file.

[3] *Ibid.*

Rapeseeds 102 and Soybeans 56.[4] The yields are double that of Rapeseed and nearly four times that of Soy based on which is currently the most used crop for biodiesel. Palm Oil is said to yield 508 gallons per acre, but is a highly destructive crop, only grown in specific tropical regions in the world. It has contributed to the vast destruction of endangered rain forests and further use of oil palm trees encourages this destruction/reliance on foreign aid. The fuel yield for Hemp is an estimate as no company has dedicated to this in real practice, as Hempstead will. Hemp is deliberately left out of the equation, despite being a clear and logical solution, due to private interest from other companies that know Hemp is the strongest competitor for economic production.

Mixing Biodiesel with current petroleum blends has an immediate market for current existing fuels. B20 (20% Biofuel) which can be adjusted to B100 to eliminate greenhouse emissions as we lead the transition to a $C0_2$ neutral, and negative, energy climate.

The ecological and economic benefits of this crop equal a multi-billion-dollar industry that has not yet been tapped. The unconstitutional yet current legal restrictions constricting Industrial Hemp and thus the national and economic security of this nation are being uplifted, and significant progress has been made towards the recognition of this crop as an Industrial powerhouse since the 2018 Farm Bill. Now is the most important time to invest in sustainable projects that will create economic boom for communities involved and the 2023 Farm Bill is the perfect policy mechanism to create thriving hemp economies throughout the United States.

A secondary product of the hemp biodiesel is the use of hemp biochar. Hemp biochar uses organic compounds as a catalyst and replaces harmful chemical fertilizers typically used in farming. This allows the crop to maximize its improvements to soil health and absorption of atmospheric $C0_2$ to form a beneficial and healthy relationship with the natural environment. Hempstead created biochar with our hemp fiber and are studying the effects of the organic compounds on our research plot. Our hemp industry partner, Western Fiber, has a USDA research grant to study hemp biochar through the University of California-Merced.

Hempstead's leadership is un-paralleled, our statements are backed by decades of scientific and mathematical research. The $2.1 trillion annual revenue of oil and gas in domestic control can come from the rural, urban, and Tribal communities producing hemp for biodiesel instead of the OPEC. All that's needed now is real world creation of products. What Hemp ultimately creates is a superior fuel that can be harvested in a few months' time, in soil no other crop can grow in, with limited water, and immediately offer economic boom as demand for our what we produce is extremely high.

SUBMITTED QUESTIONS

Questions Submitted by Hon. Kim Schrier, a Representative in Congress from Washington

Response from Kate Greenberg, Commissioner, Colorado Department of Agriculture

Question 1. Ms. Greenberg, we've seen a lot of success with the regulatory framework set up by the 2018 Farm Bill and outlined in the final 2021 USDA rule, but the multi-layered data reporting and other aspects from the rule have created some challenges for states. For example, hemp farmers have to separately report their acreage to FSA and the Washington State Department of Agriculture (WSDA), and according to WSDA, many local FSA offices didn't even know they were part of this requirement, ultimately creating confusion for everyone. Can you tell us about what aspects of the final USDA rule present compliance challenges for states? How could we incorporate flexibility into the regulatory structure going into the 2023 Farm Bill?

Answer. Colorado producers are experiencing difficulty with Farm Service Agency (FSA) reporting as county offices seem to have varying knowledge of the Agricultural Market Service (AMS) requirement. The Colorado Department of Agriculture (CDA) holds monthly meetings with the FSA Regional Office to help facilitate compliance with hemp registrants. Both CDA and FSA are assisting hemp producers with reporting, and yet we have not fully addressed the problem.

The USDA Final Rule § 990.3(a)(1) requires states to collect, maintain and report to the Secretary relevant, real-time information for each producer licensed to produce Hemp under the State Plan. Under § 990.7 the FR instructs "All producers licensed to produce hemp under the USDA-approved state or Tribal plan shall re-

[4] *Ibid.*

port hemp crop acreage to FSA and shall provide, at a minimum the following information: (a) street address, GPS, (b) Acreage dedicated to the production of hemp and (c) License or authorization identifier in a format prescribed by USDA." This requirement is redundant and can be achieved through the USDA-approved State Plan and states can include it in their monthly report to the USDA.

Another challenge for Colorado is the mandatory testing of all lots. Due to limited state resources, CDA has implemented state-certified labs and authorized third-party sampling agents. This has added additional levels of regulation and much higher costs to producers for sampling and testing. Allowing for certified seed *in [lieu] of* testing and a return to random and risk-based sampling based on intended use and compliance issues would reduce the burden for farmers and regulators.

Question 2. Ms. Greenberg, despite the authorizations in the 2014 and 2018 Farm Bills, hemp is still an emerging and developing market. While hemp farmers can legally sell their crops, there is still a lot to be done to develop domestic markets and increase market access for their crop. There are still very few processing and manufacturing opportunities for textiles and infrastructure, limiting what farmers are able to do with their crop. Therefore, there is significant value in increasing the market space for our farmers. This could look like funding for new processing opportunities for sustainable hemp product manufacturing. How can we continue to grow and incentivize hemp processing for textile and infrastructure uses in the next farm bill?

Answer. The hemp processing industry is relatively nascent in the United States. There are various ways the Government can spur development and innovation in the hemp processing sector. The first is by providing access to capital via USDA loans with terms that are favorable to new and expanding businesses that are operating in an unproven landscape. Traditional lenders often look at these businesses as high risk, but in order to be successful, they need access to competitive rates and terms that will allow the business and industry to grow.

One of the specific areas Congress can assist the industry is by allocating an earmarked resource to finance hemp research and development projects and encouraging innovation through financing incubators. Accelerators and pitch contests attract bright minds with novel business ideas and have proved to be highly effective in the IT sector and other emerging industries. Hemp has the potential to play an important role in agriculture, carbon sequestration, the food industry as well as material science and thus deserves Federal support for research and development projects.

In addition to loans, there is a need for grants to lower the barrier to entry into the hemp processing industry as well as provide seed capital to get processing businesses and infrastructure up and running, especially in rural areas close to hemp fiber production to reduce transportation costs and support the rural economy.

Beyond providing financial assistance directly to hemp processors, financial incentives in the form of tax credits for the use of hemp in end products will help jumpstart the industry by providing for robust demand for hemp fiber. Strong demand will help decrease the uncertainty and make private investment in hemp processing and infrastructure more attractive.

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