

February 13, 2018

Testimony from Cody D. Freeze, PharmD, RPh

Chairman Sloan and Members of the Committee,

The great state of Kansas is situated in a particularly favorable geographic location for the reliable production and processing of many agricultural and natural commodities. The state is consistently one of the most productive regions of the entire nation, whether for non-renewable or renewable resources. Even in the more arid portions of the westernmost counties of our state, fertile and deep soils are found. Although these soils are not particularly limited in their innate fertility or depth profile, they are prone to drought and impart increased risk of crop failure due to low rainfall.

Water scarcity is likely one of the most daunting future challenges for Kansas, particularly west of the I-35 corridor. The Ogallala Aquifer, which has served as a water source for crop irrigation will not recharge at the current rate of use. Western states, where aquifers and other sources of fresh water are drying completely at the current date, have already had to deal with the controversial issue of water rationing. More modern practices for water conservation must continue to be practiced state-wide, and all revenues of water conservation should be explored.

The best way to handle a future problem is to plan for it today. The state continues to trade in some of its iconic culture for modernity and humanity, as we see oil mining pump jacks side-by-side in areas with wind mills harnessing free energy. We see cattle grazing range fenced in with electric wire provided freely with stored solar energy. Progression through the ages has been what kept Kansas on the list of most productive states.

Therefore, today I must express testimony in support of HB 2726.

I am Kansas-educated but Missouri-raised. I am a farmer who is, at least as far as pictures go back, a fifth-generation farmer in the Dade/Cedar County area of southwest Missouri. Growing up, I was regularly exposed to common issues or challenges plaguing agricultural production. Specifically, lack of rainfall when it was too hot and dry, and excess of rainfall when it was wet and cool. My grandfather, father, little brother and myself own or manage around 1000 acres and 200-350 head of beef cattle. We grow and put up all our own hay, and we vaccinate and "doctor" most all our livestock. We occasionally grow cash crops or annual hay crops, and my experience in the fields of agronomy and soil science was autodidactic. I obtained my Bachelor of Science in Chemistry Degree from Pittsburg State University, followed by my Doctor of Pharmacy Degree in 2011 from The University of Kansas. Through schooling in Kansas, I was exposed to various similarities, differences and disparities relating to my own time farming with my family in Missouri. After school, I obtained a license to practice pharmacy in both Missouri and Kansas. In 2011, I moved back home to Missouri where I own my childhood farmland of 126 acres, and 40 head of beef cattle pairs. In 2015, Kansas came calling again, and I met my current wife and pharmacist, Dr. Allison Freeze. We own a pharmacy in Pratt and St. John Kansas, Pratt Medical Arts Pharmacy and Stafford County Drug, respectively. I still make trips back to the farm in Missouri nearly every month, and work with my brother managing my land and livestock commodities. I am stating this because I want to establish some sort of background validity and commonality as a pharmacist but also

a farmer. Currently, I consider the future challenge for Kansas commodity production: adapting to changes in consumer demand.

I believe with progressive legislation, Kansas could successfully rejoin the nation in strengthening our variety of commodities grown. The Kansas farmer should have all tools in their belt when dealing with tough variables farming commodities.

More specifically, I refer to a drought resistant crop with what I believe is unparalleled utility, *C. sativa* (hereafter referred to as “cannabis” or “hemp”). Hemp grows naturally and with ease across nearly the entire face of our planet. In Kansas, most farmers have witnessed it growing natively, where it was likely introduced over possibly over a thousand years, along with the arrival of various humans to what we call the Americas today. Through time, the utility of the plant as both a commodity crop, food source, oil source and fiber source has become apparent. Its presence in the early to late 19th century, and production for rope during the efforts of World War I in the early 20th century is well-documented.

Hemp is one of few crops to be found in nearly all ecotypes, multiple latitudes and within a multitude of climates. It may be grown in wet heavy clay, or in droughty sandy loam. Hemp thrives in rich, well-drained loam, but it can reliably persist in more drought prone soils, or in areas of particularly low annual rainfall. It can produce crops on much lower rainfall requirements than corn, soybeans or even wheat.

Hemp exhibits a remarkable variance of phenotypic appearances. This means the plant may range from wide to spindly, and short to tall, increasing its ability to be hybridized or bred to obtain specific qualities in a relatively short time. It is quite a scientific marvel by itself. Just a tiny crossbreeding program between known cultivars can result in a plant producing vastly different essential oils, fiber amounts or even differences in canopy densities, leaf shapes and root densities.

In addition to oil, seed, textile, and fiber production, certain other cultivars or chemovars (i.e., selected varieties of variable chemical traits) of hemp are being bred in other areas of the United States and other nations abroad for isolation of powerful, scientific medical breakthroughs. Unfortunately, due to prohibition of cannabis/hemp, I believe our state is sorely missing out on a clear opportunity being seized upon by states housing those willing to legislate for necessary progressive change.

Even though I am here as a farmer, I would also like to take a moment to consider hemp’s potential as a producer of various chemicals. As a pharmacist, it is my privileged duty to educate myself and the public, concerning medications. Cannabis is a treasure trove of phytomedicinal constituents, and legislation should be promulgated so it may be properly researched by accredited research leaders within Kansas. Many other states have provided such and are leading the medical discovery process. Several products of hemp are being studied and proven safe for a vast multitude of human diseases, both acute and chronic. Owing to its low toxicity and large margin of safety to its chemical constituents, it is truly a medical wonder. As a pharmacist, in my opinion we absolutely have not given the plant the medicinal attention it so much deserves. There will undoubtedly be paramount applications within the medical sector as it relates to oil, fiber and medicine. Some genetic engineers are trying to isolate the chemical engines specific to hemp to more efficiently isolate certain chemicals of interest within the laboratory setting. I believe economic and academic gain, specifically, my alma mater KU in respect to its vast drug development program, is being up unnecessarily by prohibition of production.



When planted in areas of mined land or chemical/heavy metal spills, it should also be noted hemp is a remarkable scavenger of various toxic contaminants. Removal of contaminants may be achieved by growing successive annual crops, then removing crop residue from the area.

The bulk tonnage potential of hemp per acre of land must also be considered. Biomass not only is a way of locking carbon out of the atmosphere, it is a way to produce fuel. Other than oil production via seeds or glandularly, hemp produces a vast amount of dry matter as an annual crop. In our state, on ideal loam soil with average rainfall, tonnage for the crop can be expected to be rather favorable to nearly any other annual crop available to plant, including corn. This is important when considering its potential as a source of dry matter, fuel source, conservation habitat or carbon sink (locking carbon out of the atmosphere, but as plant residue).

Multiple neighboring states are seriously considering or have already executed legislation providing for "hemp" or *Cannabis sativa L.* Funding is never infinite within a government. States are already adopting ways of harnessing the potential of hemp as a commodity crop, producing things from extremely large biomass per acre, extracting things varied from fiber to literally hundreds of medicinal oils and compounds.

This natural plant, cannabis/hemp, produces all things mentioned above (and many more), all while consuming less water than most other agricultural crops. It is relatively easy to grow in dry climates with an extensive root system, and controls runoff and soil erosion due to excess precipitation.

There was a time when Kansas led the entire world in hemp production. I believe Kansas still has the unique potential to produce some of the finest quality hemp the world has ever seen.

We have retired the coal shovels like Big Brutus from the pits of southwestern Kansas some time ago. Perhaps now is the time to pass the metaphorical baton along to the next resource producing crop for commodities. Sometimes great legislation can produce economic surges in the most fantastic ways. For this reason, I strongly believe now is the time for our great state to consider legislation such as HB 2726. Great responsibility will fall upon those who legislate and execute laws such as proposed above.

It will undoubtedly be a long and arduous process. The facts and speculation I've proposed are just such, speculation, but I will also remind my critics: legislative tasks are happening every single day around the nation regarding hemp. I feel it is time to join other states of our nation.

Attached are various graphics which house data supportive of hemp's potential role as a powerful crop for Kansas farmers.



# BILLION CROP

**UTILIZED** by humans for many thousands of years, hemp has been grown for purposes as diverse as pulp, for papermaking, fiber for rope and fabric. With gas prices now stable at over \$4/gal, Americans are clamoring for alternatives to fossil fuels, and talk of hemp ethanol production has increased.

**ETHANOL YIELD**  

 1/4 US CROPLAND  
 44 BILLION, 44 BILLION, 27 BILLION

**DRY YIELD**  

 ETHANOL PRODUCTION  
 20:1 ETHANOL TO SEED OIL

**GREENHOUSE GAS ABSORPTION**  

 13.4 TO 8.9

**GREENHOUSE GAS REDUCTION**  
 IN ADDITION to producing substantially fewer greenhouse gas emissions during burnings for fuel, cellulosic ethanol also produces 86% less GHG emissions per gallon produced than gasoline, and it leads both in land and agricultural potential of ethanol in this regard as well.  
 86% LESS GHG emissions  
 CELLULOSIC ETHANOL

**TRANSPORTATION**  
 29 OF TOTAL U.S. GREENHOUSE GAS EMISSIONS  
 19.4 LBS OF CO<sub>2</sub>  
 ONE GALLON OF GASOLINE  
 TOTAL ENERGY

**75 YEARS AGO...**  
 Ford THE INVENTOR CAR  
 IN A TRAGIC TURN OF HISTORY, Ford's job as a hemp dealer and hemp-powered car was suddenly made impossible by the passage of the 18th Amendment, which prohibited the manufacture, sale, and transport of alcoholic beverages. The very same year that he built his first working automobile.

**KEY**  
 CORN, SUGAR CANE, HEMP, SUGAR BEETS, POTATOES

## HOW GREEN ARE BIOFUELS?

Biofuels are getting a bad rap as stories of rising food prices and shortages fill the news. But the environmental, energy and land use impacts of the crops used to make the fuels vary dramatically. Current fuel sources – corn, soybeans and canola – are more harmful than alternatives that are under development.

### FUEL SOURCES

CROP	USED TO PRODUCE	GREENHOUSE GAS EMISSIONS* Kilograms of carbon dioxide created per mega joule of energy produced	USE OF RESOURCES DURING GROWING, HARVESTING AND REFINING OF FUEL				PERCENT OF EXISTING U.S. CROP LAND NEEDED TO PRODUCE ENOUGH FUEL TO MEET HALF OF U.S. DEMAND	PROS AND CONS
			WATER	FERTILIZER	PESTICIDE	ENERGY		
Corn	Ethanol	81-85	high	high	high	high	157%-262%	Technology ready and relatively cheap, reduces food supply
Sugar cane	Ethanol	4-12	high	high	med	med	46-57	Technology ready, limited as to where will grow
Switch grass	Ethanol	-24	med-low	low	low	low	60-108	Won't compete with food crops, technology not ready
Wood residue	Ethanol, biodiesel	N/A	med	low	low	low	150-250	Uses timber waste and other debris, technology not fully ready
Soybeans	Biodiesel	49	high	low-med	med	med-low	180-240	Technology ready, reduces food supply
Rapeseed, canola	Biodiesel	37	high	med	med	med-low	30	Technology ready, reduces food supply
Algae	Biodiesel	-183	med	low	low	high	1-2	Potential for huge production levels, technology not ready
Hemp	Biodiesel, Ethanol, Paper, Food & more	-319	low	low	low	med-low	20	US is only industrialized country where hemp farming is illegal

\* Emissions produced during the growing, harvesting, refining and burning of fuel. Gasoline is 94, diesel is 83.

Source: Martha Groom, University of Washington; Elizabeth Gray, The Nature Conservancy; Patricia Townsend, University of Washington; as published in Conservation Biology



# The MANY USES of Hemp

*Hemp is the strongest natural fibre in the world, known to have over 50,000 different uses!*

## TEXTILES

- Clothing
- Diapers
- Handbags
- Denim
- Shoes
- Fine fabrics

## PAPER

- Printing
- Newsprint
- Cardboard
- Packaging

## INDUSTRIAL PRODUCTS

- Oil paints
- Varnishes
- Printing inks
- Fuel
- Solvents
- Coatings

## FOODS

- Hemp Seed Hearts
- Hemp Seed Oil
- Hemp Protein Powder
- EFA Food Supplements

## BODY CARE

- Soaps
- Shampoos
- Lotions
- Balms
- Cosmetics

## INDUSTRIAL TEXTILES

- Rope
- Canvas
- Tarps
- Carpeting
- Netting
- Caulking
- Moulded parts

## BUILDING MATERIALS

- Fibreboard
- Insulation
- Acrylics
- Fibreglass substitute

**Stalk**

**Leaves**

**Roots**

- Organic compost and nutrients
- Remedy for conditions such as arthritis or joint pain, fibromyalgia, and eczema.

## THE BENEFITS OF CULTIVATING HEMP

Hemp can yield 3-8 dry tons of fibre per acre. That's four times what an average forest can yield. Hemp cultivation requires no chemicals, pesticides or herbicides.



