Trends in Wyoming Agriculture: Level of Production (1925-1999)

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The *Trends in Wyoming Agriculture* series explores changes in Wyoming's agricultural sector during the last decades of the twentieth century. Earlier *Trends* publications have focused on age of operator, income, size of operation and employment. Each of these subjects is important, in fact, integral in understanding how changes are affecting this sector of Wyoming's economy. Many of the trends identified provide challenges for traditional agriculture in the sense that change, fostered by technology and trade issues (mechanization and globalization), is forcing a re-thinking of long held cultural practices and traditions.

Trends in Wyoming Agriculture: Level of Production (1925-1999) is the last in the series. The following pages contain graphs, tables, and commentary on each of the major crop and livestock commodities produced in Wyoming over the last three-quarters of a century. Also included, is a discussion of the roles technology and government support programs have played in globalization and the level of production and its impact on agriculture.

Seventy-five years has seen little change in the state's crop and livestock mix. Cattle are still the dominant livestock species, but their edge over sheep and lamb has been greatly extended. The same crops are still grown, but their ratios have changed as hybridization has allowed more drought and cold resistant varieties to grow in the state. Changes in the level of production of each commodity have varied for different reasons. Mechanization, hybridization, fertilizers, and advanced cultural practices account for most of the increases. Decreases are due mainly to changes in technology and tastes and preferences of consumers. Still others continue at relatively unchanged levels due to physical production constraints.

I confess myself to be a great admirer of tradition. The longer you can look back, the farther you can look forward.
-Winston Churchill

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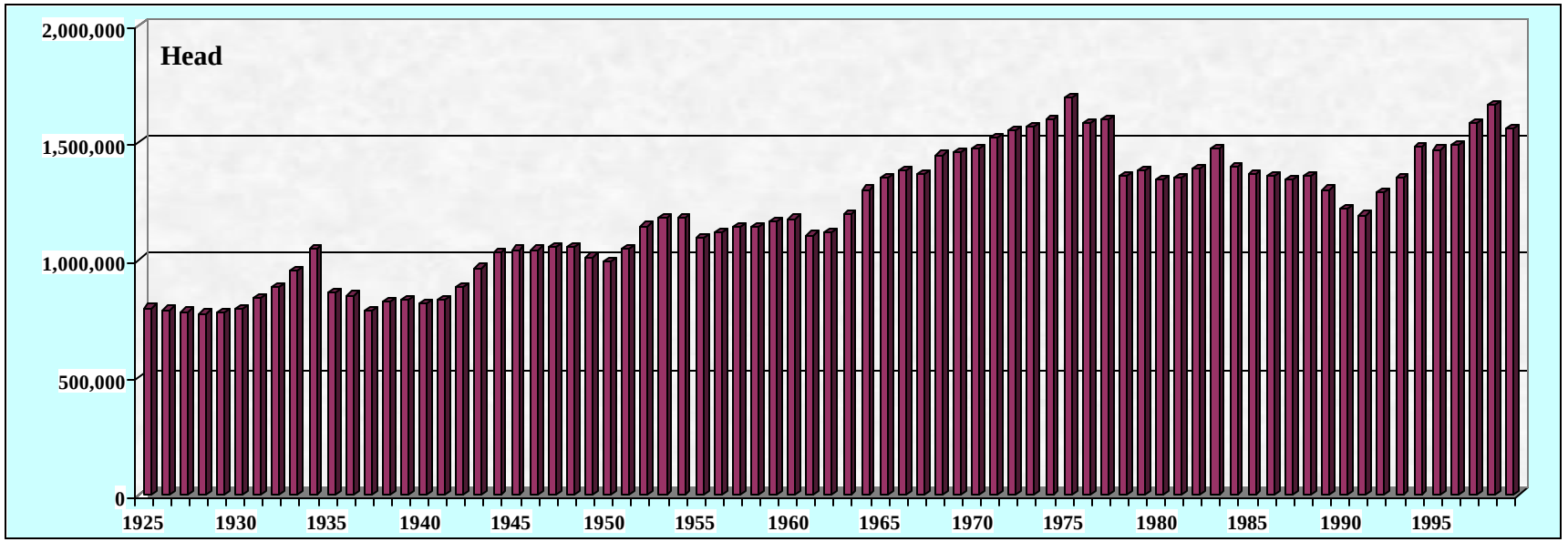
Figure 1. All cattle and calves, Wyoming (1925-1999).

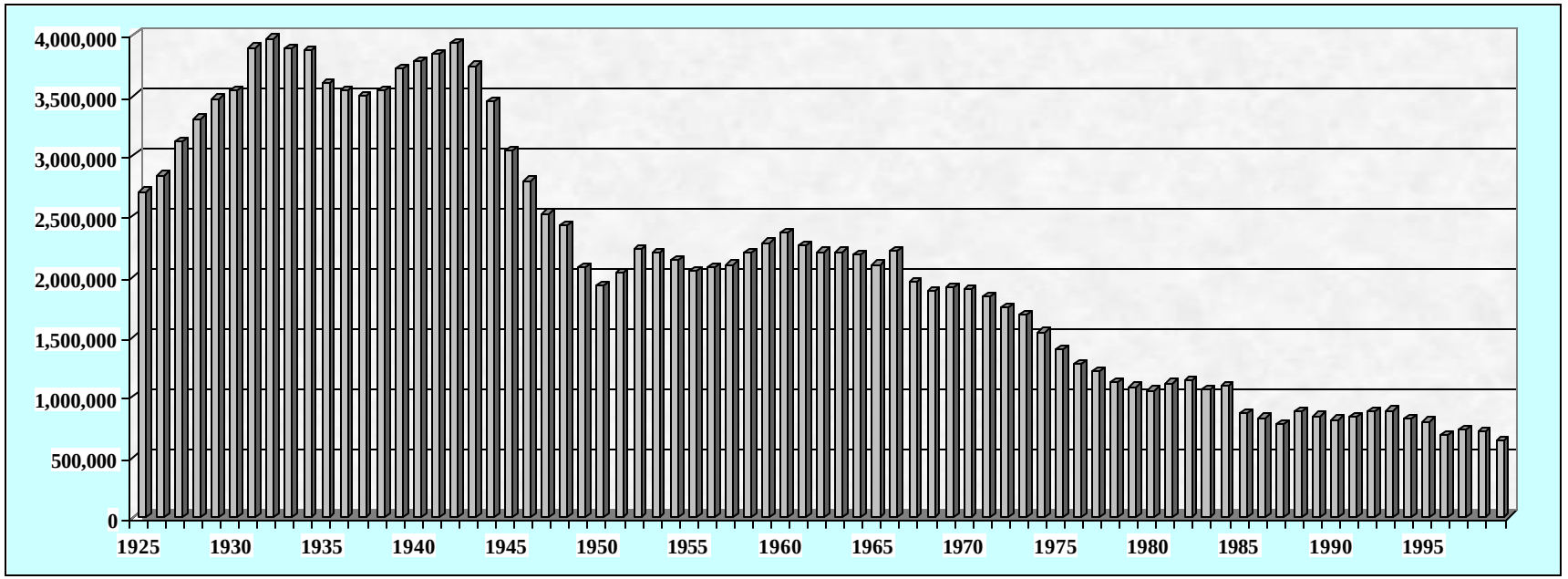


(Data source: Wyoming Agricultural Statistics, 2000)

Cattle

Cattle are the major agricultural production commodity in Wyoming. Cattle and calves accounted for 70.3 percent of all cash receipts received by Wyoming producers in 1998 (WASS, 2000). Many of the crops grown in the state are feed crops for cattle so their production directly supports the cattle industry. Consequently, the cattle market significantly influences many Wyoming producers whether they own cattle or not. Figure 1 shows all cattle and calves on Wyoming farms and ranches for the 75-year period from 1925 to 1999. The trend was generally upward until the mid-1970s. This was a period of instability in agriculture as high interest rates and high inflation eroded producer's returns and forced sales of livestock. The peak in the cattle cycle occurred in 1975 and producers sold into this market reducing herd numbers. The farm crisis in the first half of the 1980s kept herd numbers low. Poor weather and markets further cut into numbers making 1991 the lowest inventory year since the mid-1960s. Herds have rebounded sharply, however, and approached 1975's 1,690,000 head high with 1,660,000 head in 1998. The number of cattle and calves on Wyoming farms and ranches on January 1, 2000 stood at 1,580,000 head (WASS, 2000). Cattle numbers in Wyoming have increased 96.23 percent since 1925.

Figure 2. All sheep and lambs, Wyoming (1925-1999).

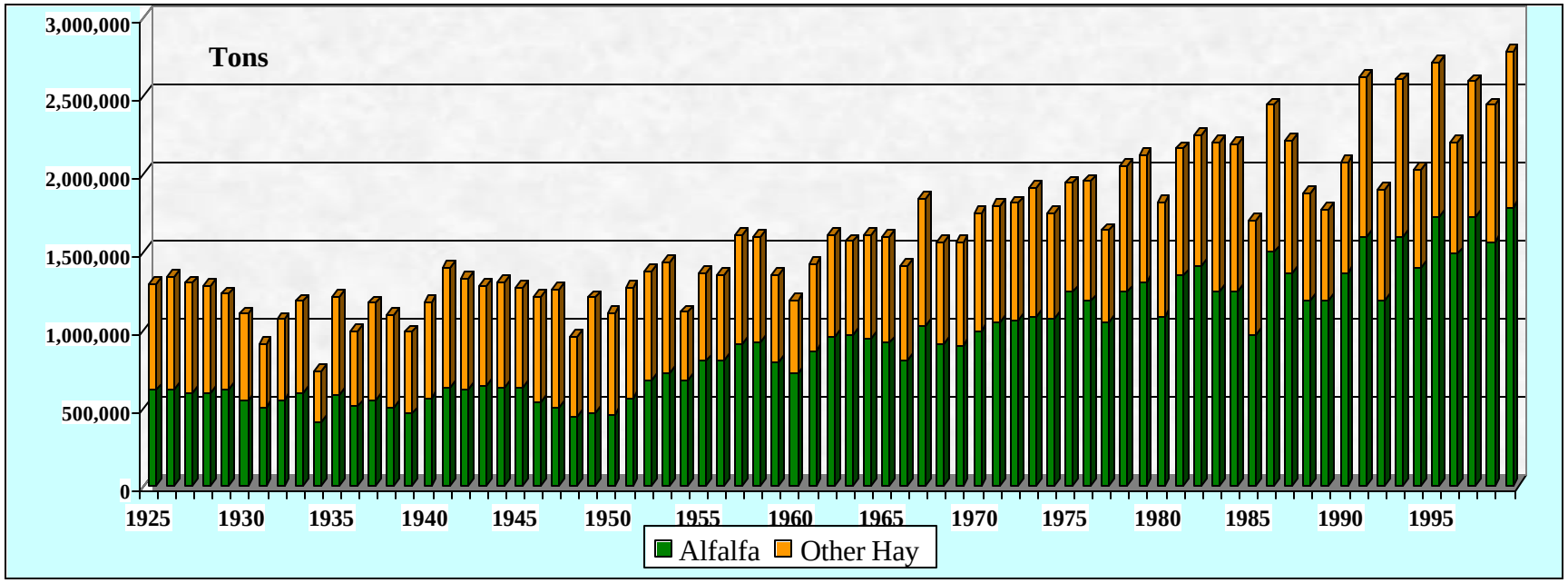


(Data source: Wyoming Agricultural Statistics, 2000)

Sheep and Lambs

Sheep came to prominence in Wyoming after the disastrous winters of the late 1880s. Ranchers raising sheep homesteaded large areas of land with lower rainfall, less suited to cattle. Sheep were the majority livestock in value and number from the 1890s through the first decade of the twentieth century (Commerce, 1920). The historical peak year reported in the census was 1910 at 5,397,161 head. Sheep numbers declined dramatically during the second decade of the twentieth century so that by 1920 there were only about a third of the sheep as a decade earlier (1,859,775 head) and the value of cattle was twice that of sheep. Figure 2 shows all sheep and lambs on Wyoming farms and ranches during the study period. Sheep numbers continued to increase through the 1920s to a 1932 peak of 3,972,000 head. Numbers almost peaked again during the war years but have steadily declined ever since. The contraction of the sheep and wool industry was caused by the advent of synthetic fibers and changing tastes and preferences by consumers. In more recent years, the high cost of labor and the globalization of trade have added continued pressure on the industry. Sheep, lambs and wool, together accounted for just 4.06 percent of all cash receipts in 1998 and just 5.06 percent of all livestock receipts (WASS, 2000).

Figure 3. All hay production, Wyoming (1925-1999).



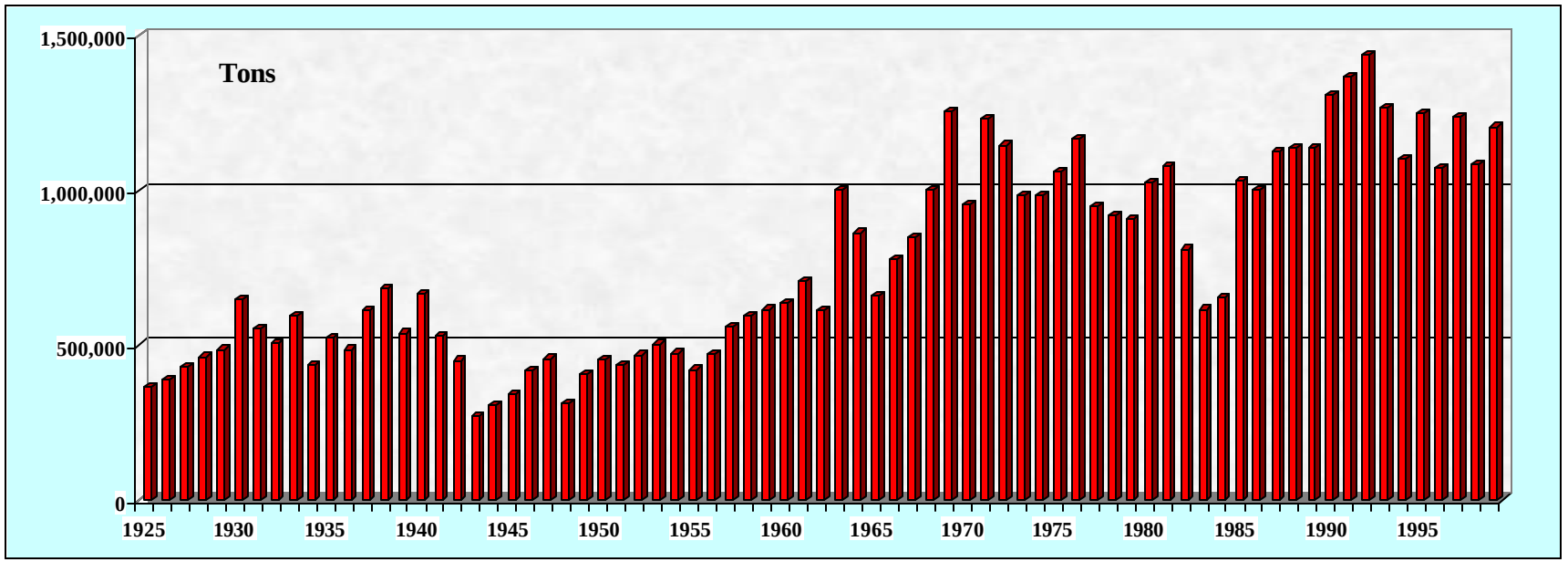
All Hay ***(Data source: Wyoming Agricultural Statistics, 2000)***

Hay is the major feed crop for wintering livestock in Wyoming. Figure 3 shows the two categories for which statistics are kept. Alfalfa is normally an irrigated crop in Wyoming because of its higher water requirement. There were about 170,000 acres of alfalfa in Wyoming in 1909 (Commerce, 1920). Production acreage was at a historical high of 660,000 acres in 1999 (WASS, 2000). Other hay is mostly native hay on improved meadows. Acreage for other hay peaked at 822,000 acres in 1949. Currently, there are 630,000 acres devoted to other hay production. The difference in production levels of alfalfa and other hay is attributed to yield. Other hay yields hovered around the 1 ton per acre mark for most of the early twentieth century; alfalfa yields averaged one and one-half to one and three-quarters ton per acre for the same period. Alfalfa yields started moving upwards in the mid-1950s with the introduction of more winter hardy varieties to Wyoming. Table 1 shows how average alfalfa yields, acreage, and production have changed over the study period.

Table 1. Alfalfa

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (tons/acre)	1.50	2.51	67.33
Acres harvested	377,400	614,000	62.69
Production (tons)	566,300	1,545,300	172.88

Figure 4. Sugarbeet production, Wyoming (1925-1999).



Sugarbeets

(Data source: Wyoming Agricultural Statistics, 2000)

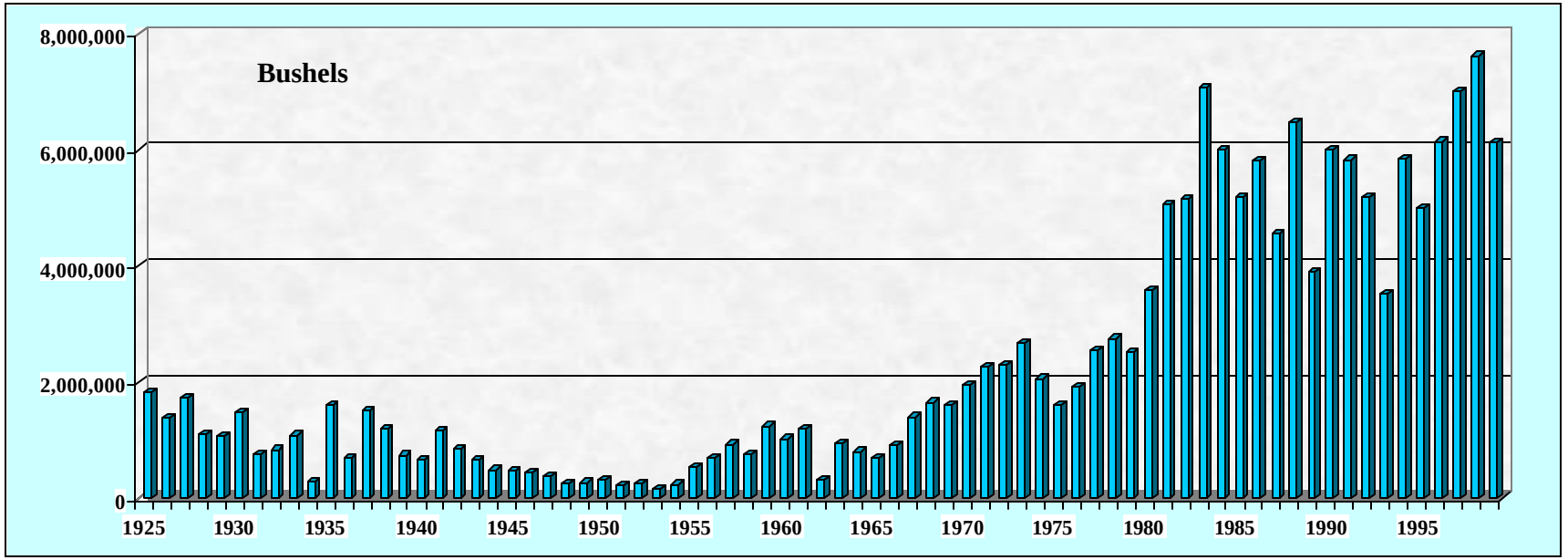
Sugarbeet production was in its infancy in the US at the beginning of the twentieth century. Wyoming acreage is listed as 1,181 acres in 1909 (Commerce, 1920). Production continued in what appears to be a cyclical pattern until the mid-1950s when new chemicals offered greater control of weeds (figure 4). Sugarbeet acreage has been relatively stable since the mid-1960s, averaging about 540,000 acres per year. Advances in labor saving mechanical production methods also have helped increase production.

Average sugarbeet yield, acreage, and production are shown in table 2. The increase in yield can be attributed to a variety of factors from better cultivation practices to the use of herbicides and pesticides to control weeds and nematodes.

Table 2. Sugarbeets

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (tons/acre)	11.55	20.05	73.59
Acres harvested	42,200	61,470	45.66
Production (tons)	486,300	1,233,700	153.69

Figure 5. Corn for grain production, Wyoming (1925-1999).



Corn for Grain

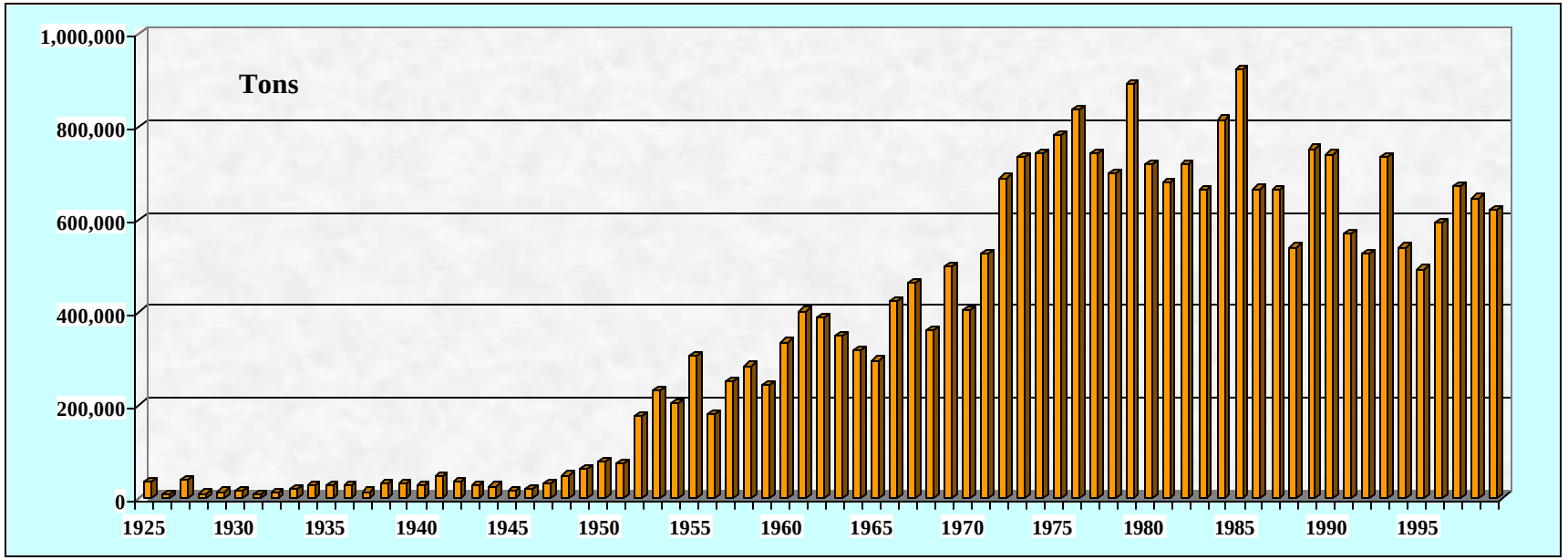
(Data source: Wyoming Agricultural Statistics, 2000)

Corn is an important feed crop in Wyoming whether as grain or silage. Production suffered in the early years due to the marginal climate for corn in most of Wyoming (figure 5). Early varieties were not well adapted to the low humidity, cool nights and short growing season of Wyoming. Corn production was effectively confined to the eastern half of the state. Acreage for the first ten years in the series was similar to that of the early 1980s, but yields where about one eighth that of the latter years. Table 3 shows average yield, acreage and production values for the first and last ten years in the series. Note that even though acreage dropped, yield and production soared. Yields started increasing in the early 1960s and made significant gains starting in 1980. Most Wyoming corn is grown as an irrigated crop, except in Laramie County where some dry land corn is grown. In 1999, 52,000 acres of corn for grain were harvested in Wyoming.

Table 3. Corn for grain

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (bushels/acre)	14.07	114.6	87.72
Acres harvested	78,900	50,600	-55.93
Production (bushels)	1,152,700	5,831,900	405.94

Figure 6. Corn for silage production, Wyoming (1925-1999).



(Data source: Wyoming Agricultural Statistics, 2000)

Corn Silage

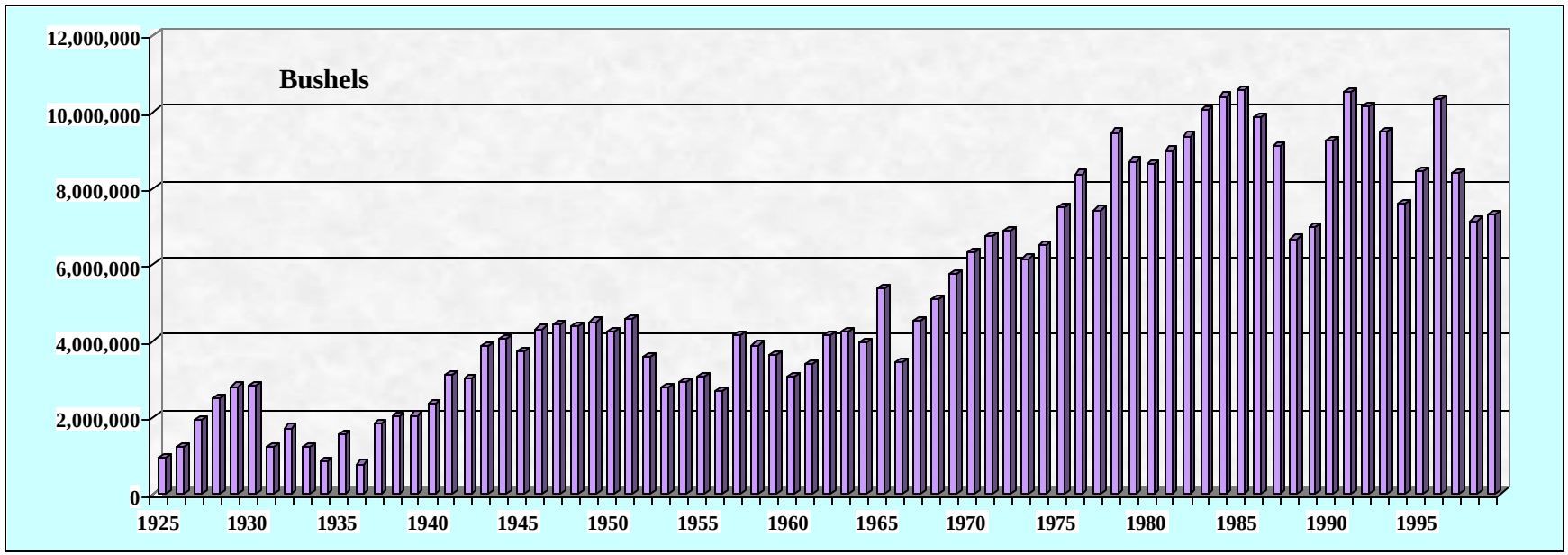
Corn silage production was slow to take hold in Wyoming as shown in figure 6. Not only were there problems with climate adaptable corn varieties, but the technology of chopping and storing silage was slow in adapting to the region. Peak production occurred in 1985 with 924,000 tons. Average values for the first and last years in the series are shown in table 4.

Total corn acreage (grain and silage) in Wyoming has remained in a narrow range since 1970, averaging 87,600 acres planted per year. Silage production has declined slightly, but corn for grain production has increased. New varieties of early maturing corn have allowed producers to have a cash crop in corn for grain as opposed to silage, which is primarily fed on the farm.

Table 4. Corn silage

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (tons/acre)	5.62	18.3	225.62
Acres harvested	3,700	33,700	810.81
Production (tons)	18,800	614,000	3,165.96

Figure 7. Barley production, Wyoming (1925-1999).



Barley

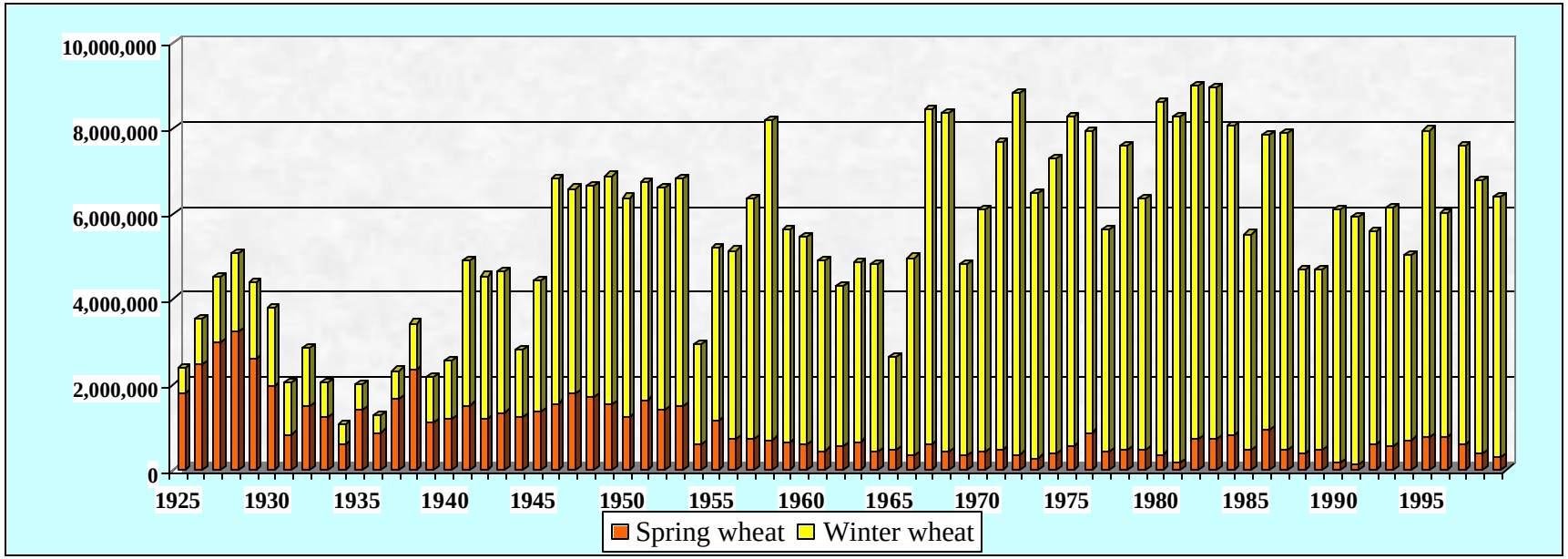
(Data source: Wyoming Agricultural Statistics, 2000)

Figure 7 shows Wyoming barley production. Both malt and feed varieties have been present since the turn of the last century, but feed barley appears to have dominated early (data are scant). Barley does well at high altitudes and in cool climates, which makes it a good crop choice for Wyoming. Malt barley production expanded significantly in the 1970s and 1980s when Coors Brewing Company increased contracts for irrigated malt barley in the Big Horn Basin. Malting varieties accounted for about 62 percent of barley production in 1985 (Torok, 1988). The share of barley to malting varieties has increased to about 70 percent by 1999. Coors announced that it would no longer be contracting in the Big Horn basin in 1993 due to stagnant demand for beer and new varieties, which would produce sufficient quantities on acreage, contracted in other locales. Malt barley is still grown in the Big Horn Basin and some is now grown in southeastern Wyoming. Average production information is shown in table 5.

Table 5. Barley

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (bushels/acre)	21.90	82.00	274.43
Acres harvested	80,800	108,500	34.28
Production (bushels)	1,723,800	8,859,000	413.92

Figure 8. All wheat production, Wyoming (1925-1999).



(Data source: Wyoming Agricultural Statistics, 2000)

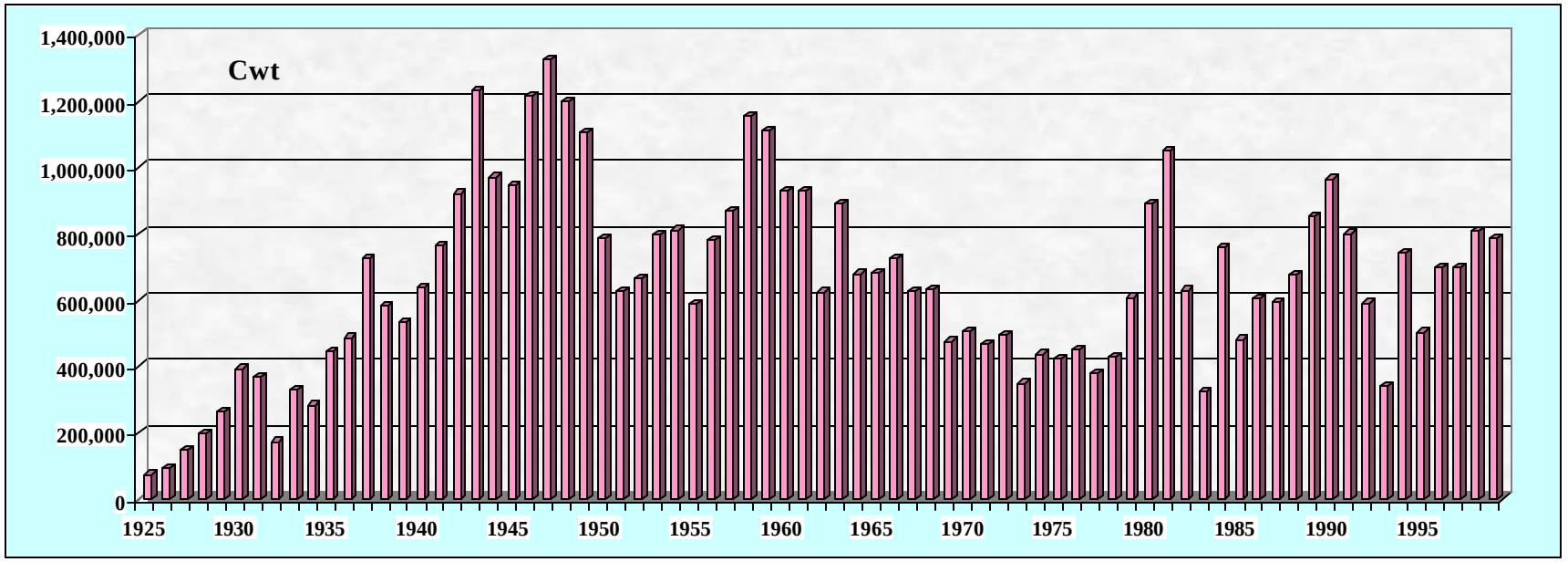
All Wheat

Wyoming was originally considered too dry for wheat production. Advances in dry land farming at the beginning of the twentieth century encouraged many people to try, sometimes with disastrous results. Drought during the great depression severely reduced yields and encouraged a rethinking of traditional production practices. One result was the shift away from spring wheat into winter wheat varieties. Yields for both spring and winter wheat have more than doubled from their 1925-1934 averages, but acreage for spring wheat in Wyoming has been minimal since about 1960. Table 6 shows that average yield and acreage for winter wheat have doubled and total production has more than tripled over the time period.

Table 6. Winter wheat

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (bushels/acre)	12.96	29.2	125.30
Acres harvested	99,500	200,500	101.50
Production (bushels)	1,247,100	5,859,500	369.85

Figure 9. Dry bean production, Wyoming (1925-1999).



Dry Beans ***(Data source: Wyoming Agricultural Statistics, 2000***

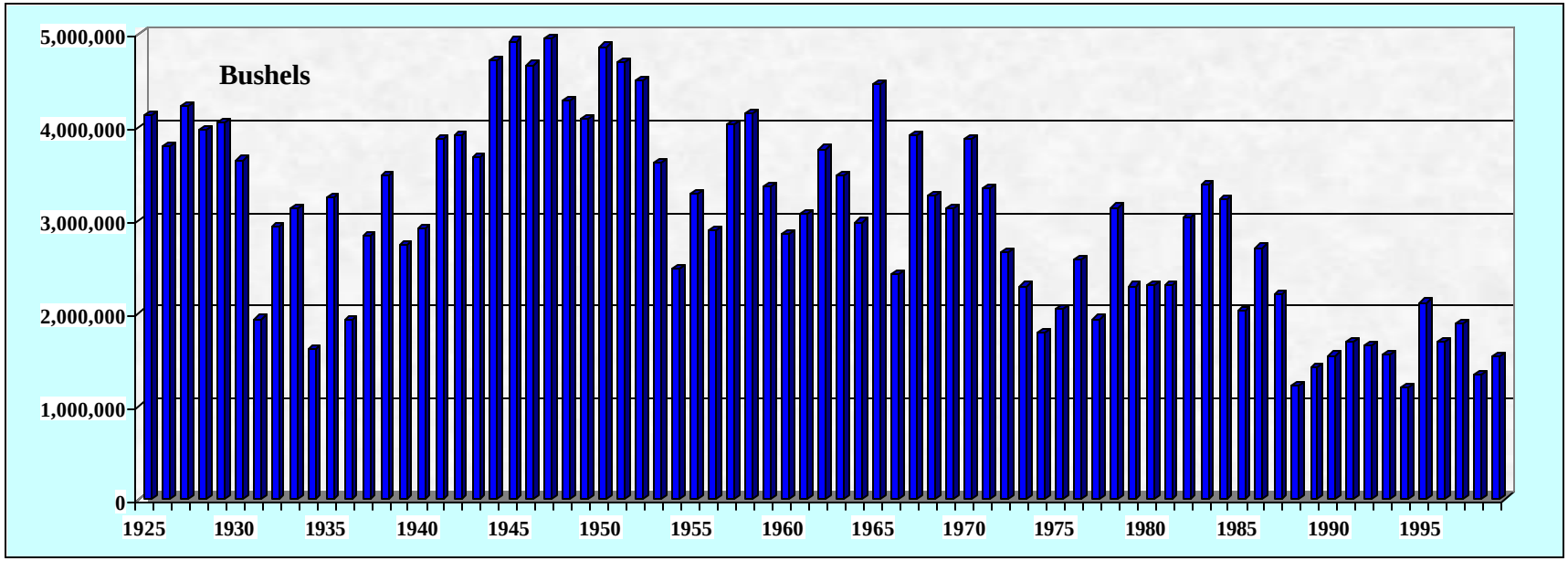
Dry bean production peaked in Wyoming in 1947 at 1,328,000 cwt.(figure 9). Per capita dry bean consumption in the U.S. peaked two years earlier at 11 pounds per person per year. Per capita consumption trended downward until 1981. Since then, consumption has trended upward, especially in the 1990s. Changes in tastes and preferences toward better nutrition plus increased immigration appear to be driving the trend in higher bean consumption (USDA, 2000). Average yield, acreage and production for dry beans are shown in table 7.

As with many agricultural commodities, bean production tends to lag prices. That is, higher production years will occur after the price of beans has started to fall in the market. The price of beans have been in a slump for the past three years, with the price decreasing by 10 percent in each of the last two years. Nationwide, 1999 was the fourth largest planting in 55 years with the lowest prices since 1992 (USDA, 2000).

Table 7. Dry beans

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (Cwt./acre)	8.73	19.49	123.28
Acres harvested	25,600	35,300	37.89
Production (Cwt.)	232,500	693,800	198.41

Figure 10. Oat production, Wyoming (1925-1999).



Oats

(Data source: Wyoming Agricultural Statistics, 2000)

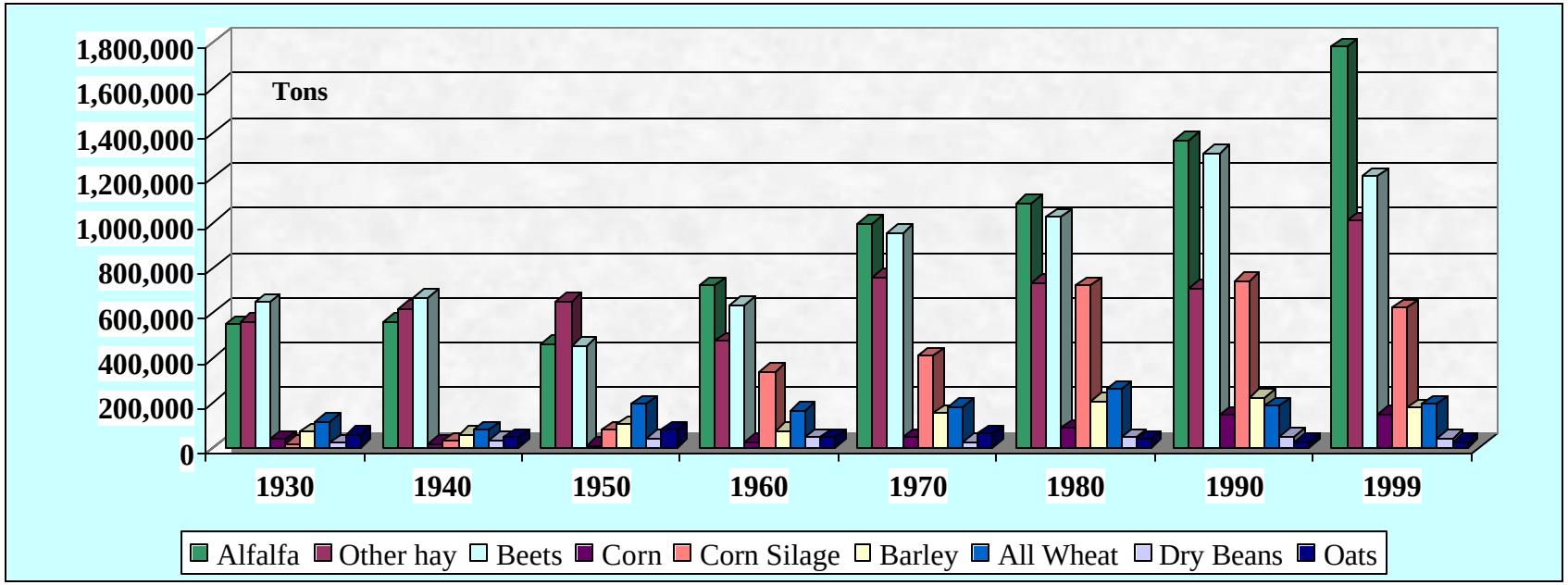
Oat production in Wyoming has been trending downward since the end of World War II (figure 10). Oats are typically used as a feedstock for cattle and horses. Table 8 shows that oats are one of the few commodities to show a decrease over the time period. The drop off in oat production coincides with the increase in alfalfa production in the mid-1950s. It is likely that producers started substituting alfalfa for oats starting about that time. Oat production appears to have achieved a base level starting in 1990 with relatively stable production levels occurring since then.

Although oats are often associated with horses, there is little correlation between horse numbers and oat production. The agricultural horse population peaked in Wyoming in 1919 at about 225,000 and then declined steadily until about 1960. Since that time, the number of horses on farms and ranches in Wyoming has fluctuated in a relatively narrow range of between 30,000 to 50,000 head.

Table 8. Oats

	1925-1934 Avg.	1990-1999 Avg.	Percent Change
Yield (bushels/acre)	25.25	55.3	119.01
Acres harvested	132,000	29,500	-77.65
Production (bushels)	3,339,000	1,621,500	-51.44

Figure 11. Production of major Wyoming crops (1930-1999).



(Data source: Wyoming Agricultural Statistics, 2000)

Level of Production

Figure 11 shows production for major crops in Wyoming at the start of each decade since 1930. All production has been converted to tons to give a rough idea of the change in the level of production in the state. Clearly, from this aspect, farmers and ranchers are producing more than ever before. And since there are fewer producers, (15,512 in 1925 versus 9,232 in 1997) productivity per producer has increased significantly. Mechanization, the substitution of mechanical for human labor, is the chief reason for the change. Other significant contributions have come from the use of improved crop varieties, fertilizer and more advanced agricultural practices.

Technology, Price Supports and Globalization

The changes in agriculture in the last 75 years are the result of massive changes in technology in several areas. Mechanization is probably the most visible area as agriculture moved from human power and horse drawn equipment to large engine driven farm machinery in the space of less than fifty years. This unprecedented technological step is matched by the revolution in hybridization that has dramatically increased yields during the last half of the twentieth century. In Wyoming alone, new varieties of alfalfa and corn have extended the range (by shortening time to maturation) of these crops, allowing them to be grown in most regions were sufficient water is available. Most other crops have had new varieties developed that are more disease resistant and drought or cold tolerant.

Chemical fertilizers, pesticides and herbicides also have improved significantly and there is promise that there is more to come as science peers down to the molecular level to study the workings of natural systems. Electronics, already pervasive on the farm, continue to intrude into every aspect of agriculture allowing for advanced monitoring of soil, crops, livestock and machinery for increased productivity.

Technological change increased crop yields and livestock productivity allowing the percentage of the population engaged in providing society's food needs to drop from about 30 percent in 1920 to about 2 percent today. The surplus rural population moved to cities helping to fuel industrialization in the American economy. This socioeconomic ripple effect is sometimes overlooked, yet it has transformed and continues to have significant impacts on the national economy.

As agricultural productivity increased, commodity surpluses resulted in price declines. Government's solution was initially to install price supports to help the agricultural sector weather what were thought to be short-term problems with supply and demand. In actuality, these were structural shifts caused by the introduction of new technology (farm machinery). Once installed, price supports are politically difficult to remove. Price supports are typically aimed at grain farmers. Livestock producers are affected through their purchase of grain as a feedstock and through changes in market prices that reflect the level of grain stocks used by feeders. The following discussion puts price supports in a historical context to show how government involvement in production agriculture evolved and how it is related to the current situation with respect to global markets.

U.S. Government support for farm prices has a relatively short history. The Federal Farm Board's (FFB) government sponsored grain storage program was viewed as a temporary measure resulting from the reduced demand of the great depression (The FFB was created by President Hoover in 1929). Additional price supports were instituted to deal with the emergency by various government entities throughout the 1930s. Federal programs continued through the war years to stimulate production in support of the war effort. Concerns of a post war recession similar to the early 1920s led to the Farm Act of 1949, which allowed for price supports, marketing quotas and acreage allotments. The Farm Act of 1949 is also important because it is the last permanent farm legislation to go into law. The farm bills currently in use are amendments to the 1949 act.

The effects of increased mechanization began to be seen again in the farm sector in the mid-1950s with growing grain surpluses. Efforts to reduce the surplus through reduction of support programs were attempted for the next twenty years, but met with heavy political resistance. Other methods to control surpluses such as the removal of land from production were tried with varying levels of success.

By the end of the 1960s, there was a growing consensus among policy makers that competitiveness in international markets was the solution to the surpluses. Yet the United States did not have a major influence on global markets due to price supports and fixed exchange rates, which effectively priced US commodities out of the market. A major step in the direction of market oriented pricing occurred in 1972 when the Soviet Union decided to purchase large amounts of wheat due to a failed harvest. Coupled with the free

floating US dollar in world markets instituted in 1973, the Soviet grain sales served as an outlet for the surpluses and paved the way for US farm policy to shift toward a free market solution. Farm policy since the early 1970s has supported the market oriented solution to surpluses in agricultural commodities to varying degrees.

The movement away from support programs has increased volatility in farm income. Increased mechanization requires producers to borrow more to finance larger machinery. In addition, falling or stagnate crop and livestock prices have resulted in shrinking margins and the need for producers to borrow for additional land purchases in order to produce more. In the early 1980s support programs for agricultural products were cut further in an effort to control government spending. As world market prices fell, US producer's returns turned negative resulting in the farm crisis. Many producers who had accumulated high levels of debt during the years of high exports in the 1970s failed. Producers who survived the farm crisis tended to have lower debt.

The decade of the 1990s was the beginning of the globalization of trade on a much larger scale. The collapse of the Soviet Union and its satellites paved the way for the opening of new markets worldwide. Asia, in particular, made significant gains as a net importer of agricultural commodities. The Asian financial crisis of 1997 now appears to be a regionally limited problem in the global effort to liberalize trade agreements. Other events like this are not unlikely as other developing nations confront similar problems dealing on an international level.

Trends going forward

Globalization's impact on the level of production appears to be just beginning. Technology helped to unlock production capacity in American agriculture, but globalization will unlock the markets allowing producers to access to demand worldwide. The danger is that weakened global demand such as seen during the Asian financial crisis will have a more direct impact on US producers. Plus, competition from low cost producers (such as Argentina and Australia in the beef market) will keep returns low.

Producers, already under pressure from shrinking margins, are likely to see the trend continue. Many challenges await traditional agriculture and structural shifts already underway will most likely continue the momentum. The meatpacking industry has been cited as an example of an area where consolidation and concentration are producing "changes in livestock marketing with a shift away from spot markets to direct contracting between livestock growers and processors…"(USDA-ERS, *Concentration*, 1999). If this prognosis is correct, then those structural shifts will trickle down vertically through the sector, forcing changes in production practices. "Industrialization may overwhelm existing environmental controls, create intense new stresses on local public services, undermine the incomes of producers using more traditional production methods and change rural communities" (USDA-ERS, *Concentration*, 1999).

The longer-term outlook seems to portend improvement in the agricultural sector, particularly in the area of exports. Demand worldwide is growing and export prices are strengthening. Current over supplies in grain stocks are expected to shrink in the next few years. Incomes in developing countries are at levels where consumers are starting to diversify their diets with more imported foods,

especially meat (USDA, 2000). These indicators point to a stretching out if not movement away from the cattle cycle as beef demand becomes more globally focused.

Mechanization and technology in general will continue to affect agricultural practices. Electronics and information technology (computers, wireless communications, global positioning system devices) are set to make the most inroads on the farm and ranch. Although there is concern about the use of bio-engineered crops and livestock, advances in bioengineering are already finding their way onto the farm. At this writing, the rewards appear to outweigh the risks, but many producers are taking a wait-and-see attitude.

Wyoming agriculture is focused on livestock production and associated feed crops. There is no indication that this will change. The methods, markets and the way the products are produced may change, but climate dictates that grazing will remain the principle activity for most of the land area of the state.

Summary

The level of agricultural production in Wyoming (both crop and livestock) has significantly increased over the last three quarters of a century. Only three of the major crops and livestock categories surveyed showed declines: spring wheat, oats and sheep and lambs. Major increases where seen in cattle, alfalfa, corn, corn silage, sugarbeets and barley. These advances are mainly due to increased mechanization, fertilization and the use of drought tolerant, winter hardy plant varieties more suited to Wyoming.

For more information on trends in Wyoming agriculture or for downloadable copies of this and other *Trends in Wyoming Agriculture* publications visit the Wyoming Economic Atlas at http://Agecon.uwyo.edu/Econdev

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