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Women in Agriculture

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WOMEN IN AGRICULTURE

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Key Words

1. Principle Farm Operators
2. Degrees Conferred
3. Faculty Labor Force

Abstract

Women have always had a stake in agriculture. The number of women as key farming operators rose from 28 percent to nearly 60 percent from 1940 through the mid-1990s (Blau, Ferber, & Winkler, 2014, p. 27) as men were sent to war during WWII (Adams, 1997, p.5). At the same time, unfortunately, the total number of farms declined by more than half from 1940 to 1980. (Labao & Meyer, 2001, pp. 107-108). In an effort to understand historical trends of women's involvement in agriculture, a research project was performed tracking the participation rate, collegiate enrollment, and employment as faculty of women in agriculture across the United States and in Wyoming.

The goal of this research was to analyze historical trends of women's involvement in agriculture. The first research objective was to determine the trend in women's participation in agriculture by comparing the number of women as principle operators across the U.S. to Wyoming. The second research objective was to determine the trend of the rate at which women have received Bachelor's, Master's, and Doctorate degrees in general across the U.S. and in Wyoming compared to the rate at which women have received agricultural degrees at those levels. The final research objective was to determine the trend in the number of women faculty members of agricultural programs across the U.S. and in Wyoming compared to the number of women faculty members in general. It was determined that women's participation rate, collegiate enrollment, and faculty status in agriculture across the U.S. and in Wyoming has historically increased.

Introduction

Women have had a stake in agriculture since 10,000 B.C.. From occupation segregation after the innovation of the plow, to stepping into men's shoes during World War II, to becoming more prevalent as principal farm operators, women have grown to be the stakeholders they are today. With the industry stepping away from arduous labor in farming and toward managerial and operational production, women have larger and greater opportunities to not only enter the industry but also grow and prosper in it as well.

Women's direct impact as key operators or as contributing operators has been relatively intangible throughout history. Nearing the end of this intense transition period, however, women's agricultural participation can be more clearly defined through data provided by the USDA Agriculture Census, and foreshadows their ability to find success as agriculturalists in the 21st century.

In order to understand historical trends of women's involvement in agriculture, the research question of this study was: Do historical trends show an increase in women's participation in agriculture across the U.S.? In Wyoming? Specifically, have participation rates of women compared to men increased in the roles of principle farm operators, attainment of Agricultural Bachelor's, Master's, and Doctorate Degrees, and faculty member employment? It's logical that women's presence in agriculture has increased substantially, but this research will analyze the rate at which women have increased their presence in the industry.

In order to analyze participation rates between the 1977-1978 and 2015-2016 academic years, data will be collected from the USDA Census of Agriculture including the USDA Census of Agriculture Historical Archive, the National Center for Education Statistics, and the

University of Wyoming Office of Institutional Analysis. The findings from these resources, comparing the difference between men and women's prevalence in agriculture, will help to predict future involvement of women in the industry.

Literature Review

Women have always been involved in agriculture. Hunter-gatherer techniques circa 10,000 B.C. held women responsible for collecting "food and fuel, fetch water, prepare drinks and vegetable foods, and cook." (Dahlberg, 1981, p. 13). In fact, "it has been demonstrated that the gathering activity of women provided three quarters of the daily calorie intake of their community." (Hansen, Jensen, & Skovsgaard, 2012, pp. 1-2).

Furthermore, "in the era prior to the industrial revolution, most women worked on farms and contributed heavily to the output of goods in addition to providing housekeeping services." (Bergmann, 1981, p. 85). The implementation of the plow, however, "led to a division of labor within the family in which the man used his physical strength in food production, and the woman took care of child rearing, food processing and production and other family-related duties. The consequence was that women's role in society no longer gave her economic viability on her own." (Hansen, Jensen, & Skovsgaard, 2012, p. 2). Beforehand, women's participation in the agricultural labor force was highly valuable, which offered opportunities for independence. With advances in technology, though, gender roles were validated and men and women's work began to look very different. Men are physiologically built larger and heavier than women with the ability to grow muscle faster (Conner, 2000), and therefore can outperform their counterparts in laborious tasks, like plowing. Decreased participation levels of women in agriculture came as a consequence of this division of labor. As of 1840, "the labor force participation rate for men was 84 percent, but only 18 percent of all women were paid in the labor force" (Blau, Ferber, & Winkler, 2014, p. 23).

Another hurdle women have had to overcome was during the period of industrialization in the late eighteenth and early nineteenth centuries. Between 1850 and 1900, the number of farms in the United States grew from 1.4 million to 5.7 million. (United States Department of

Agriculture, 1920, p. 32). This trend continued to increase through 1910 until a plateau developed in the 1930s at around 6 million, (United States Department of Agriculture, 1935, p. 22), and by 2012 the total number of farms in the United States had plummeted to a little over 2.1 million. (United States Department of Agriculture, 2012, p. 7).

As the number of farms in the U.S. decreased, the number of acres per farm rapidly increased. In 1935, the average acreage per farm was 154.8 acres, (United States Department of Agriculture, 1935, p. 22), while in 2012, the average acreage per farm was 434 acres (United States Department of Agriculture, 2012, p. 7). Consequently, "agricultural intensification led to a patriarchal division of labor and its associated cultural beliefs which still shape gender roles today." (Hansen, Jensen, & Skovsgaard, 2012, p. 13). Agricultural production practices, developed from the intensification of agriculture, catered primarily to men. At the same time, women married to these farmers fell into the caste of becoming housewives. Both in agricultural and in white-collar work, "real wages for men got to a level such that many men were able to afford the services of a live-in domestic servant, who also served as a wife. This development segregated women's productive activities." (Bergmann, 1981, p. 85). With less and less work available for women seeking employment in agriculture, those involved in the industry served most likely as housewives. Because the USDA Agriculture Census did not collect data regarding the gender of principle farm operators until 1978, the segregation between men and women as farm operators prior to 1940 is an assumption.

In the middle of the 20th century, things began to change. When the United States entered the Second World War in 1941, women thrived in agriculture; "as young men went off to war, women stepped in to take their places" (Adams, 1997, p. 5) as key farming operators. Across all industries, "from 1940 through the mid-1990s, women's participation rate rose from 28 percent

to nearly 60 percent" (Blau, Ferber, & Winkler, 2014, p. 27) across all industries. In fact, by 2012 there were more than 288 thousand farms reported principally operated by women. (United States Department of Agriculture, 2012, p. 1).

Meanwhile, as the number of farms and number of principle operators decreased, the acreage per farm size as well as income per farm increased dramatically. "From 1940 to 1980, the farm population declined tenfold, the number of farms declined by more than half, average acreage more than doubled, and real average sales increased sixfold." (Labao & Meyer, 2001, pp. 107-108).

Women are not only becoming increasingly involved in agriculture but finding more success in agriculture as well. One reason women are finding further success in the industry is that "there is now an increased emphasis is being put on business management in farming, relative to production management." (Schafer, 2012). This means that agricultural occupations are migrating toward cognitive configuring, like data analysis, marketing, information technology and managing, which provides women alternative agricultural opportunities to physical labor. Furthermore, a study done to examine strategies used by female operators of small to medium sized farms in Pennsylvania found that, "women often lead the way in innovation on small and medium-sized farms as business owners and community leaders, and this is connected to larger-scale movements forwarding gender equity." (Trauger, Sachs, Barbercheck, Braiser, & Kiernan, 2009, p. 53). Thus women have begun to redefine the measurement of success in the industry.

On a statewide level, "female principal farm operators in Wyoming increased by nearly one percent between census periods." (Ballenger & Ritten, 2014, p. 13). Over the five-year

census period, female Wyomingites were shown to have increased their presence in the agricultural industry.

Taking a close look at the state of Wyoming provides substantial evidence for women's bright outlook in agriculture. By 2011, "women are more likely than men to have finished both high school and have some college training." (Connolly, 2011, p. 12). In fact, from 1940-1980, the percentage of Agriculture & Natural Resource Bachelor's Degrees Awarded to Women was 2.7% during the 1965 academic year and 48.7% during the 2010-2011 academic year (Blau, Ferber, & Winkler, 2014). Furthermore, "office and administrative support workers are expected to increase by 5,235 jobs" over the next five years. (Connolly, 2011, p. 27). Ultimately, women are not only becoming more highly educated than their counterparts, but the number of jobs in relevant occupations are expected to increase as well.

A study conducted by J.A. Crowe and J.R. Goldberger (2009), helped shape the direction of the research question of this paper. The study suggests that "compared to their male colleagues, female faculty in land-grant colleges of agriculture were more concerned about the social and environmental consequences of biotechnology and less likely to endorse stronger linkages between public agricultural-research institutions and private industry" (Crowe & Goldberger, 2009, pp. 500-501). Specifically, "the percentage of agricultural-science doctorates awarded to females has steadily increased over the past 40 years from less than 1 percent in 1966 to 36 percent in 2005." (Crowe & Goldberger, 2009, p. 510). This indicates an improvement in the discrepancies between male and female faculty members in colleges of agriculture at universities across the United States. Thus the outlook for women in agriculture has opportunity to immensely expand.

Methodology

Women as Principle Operators of Farms

The USDA Census of Agriculture has recorded information regarding the total number of farms, as well as the division between genders as principle operators of farms, in increments of five years. No data was collected regarding the division between genders as principle operators of farms prior to 1974 by the USDA. Thus data was collected from the USDA between 1974 and 2012 to determine the percentage of women as principle operators.

The USDA Census of Agriculture was used to compare the state of Wyoming to the country as whole. Historical data regarding women as principle operators was obtained beginning in 1974. An Excel chart was then built to display the differences between the total number of farms in the U.S. to the total number of women as principle operators in the U.S., as well as to compare those values relevant to the state of Wyoming.

After collecting data regarding the total number of farms compared to the total number of women as principle operators, the percentage of women as principle operators compared to the total number of farms was recorded for both the U.S. and the state of Wyoming.

Bachelor's, Master's, and Doctorate Degrees Conferred to Women

Information was collected from the University of Wyoming Office of Institutional Analysis concerning the rate at which women have received agricultural bachelor's, master's, and doctorate degrees from the University of Wyoming compared to the rate at which women have been receiving bachelor, masters, and doctorate degrees across all majors. Data were presented in the form of the number of degrees awarded to women as a percent of all degrees awarded within the College of Agriculture & Natural Resources between the years 1988 to 2016.

A second document compiled by the University of Wyoming Office of Institutional Analysis included data organized as all degrees awarded between 1977 through 1988 across bachelor's, master's, and doctorate students in each college at the University of Wyoming.

Data collected by the National Center for Education Statistics (NCES) was used to represent the number of overall bachelor's, master's and doctorate degrees conferred to women in the United States ranging from 1970 to the 2015-2016 academic year, compared to the number of Agricultural & Natural Resources degrees conferred to women. Information was organized by total number of degrees conferred at each educational level, then separated by total number of degrees conferred to males and to females at each level. Unfortunately, the data regarding the number of women in the U.S. who have been awarded agricultural degrees at all levels spanned from 1970 to 2011, rather than from 1977 to 2016. Therefore, trend lines were utilized to forecast the following five years of data.

Women as Faculty Members in Agricultural Programs

The number of women with the qualifications to be employed as faculty members in secondary educational programs was observed from the data regarding the total number of women who have been awarded agricultural doctorate degrees in the U.S., collected from the NCES. This information was compared to the number of women with general doctorate degrees. An assumption was made that because women with doctorate degrees make up the labor force for employment as faculty members at collegiate institutions, it was interpreted that the number of women who have been awarded Doctorate Degrees, including Agricultural Doctorate Degrees, reflect the number employed as faculty from 1977 to 2016.

Results

Women as Principle Operators of Farms

The total number of women as principle operators increased from 128,170 in 1978, which represented 5.17% of the total number of farms across the United States, to 288,264 in 2012, which represents 13.67% of all farms in the country. At the same time in the state of Wyoming, the total number of women as principle operators increased from 478 in 1978, representing 5.63% of all Wyoming farms, to 1,618 in 2012, representing 13.79% of all farms in the state. The number of women as principle operators in relation to the number of total farms, for both the U.S. and the state of Wyoming, has plateaued since between 2002 and 2007 until 2012. As shown on Figure 1, the rate at which women in Wyoming are becoming principle operators of farms is expected to continue to increase at 1.47% every year while the rate at which all women in the U.S. are becoming principle operators of farms is expected to continue to increase at 1.41% every year. Because the data provided by the USDA Farm Census was complete only up to 2012, it was forecasted that the historical trends observed between 1978 and 2012 will continue through 2017.

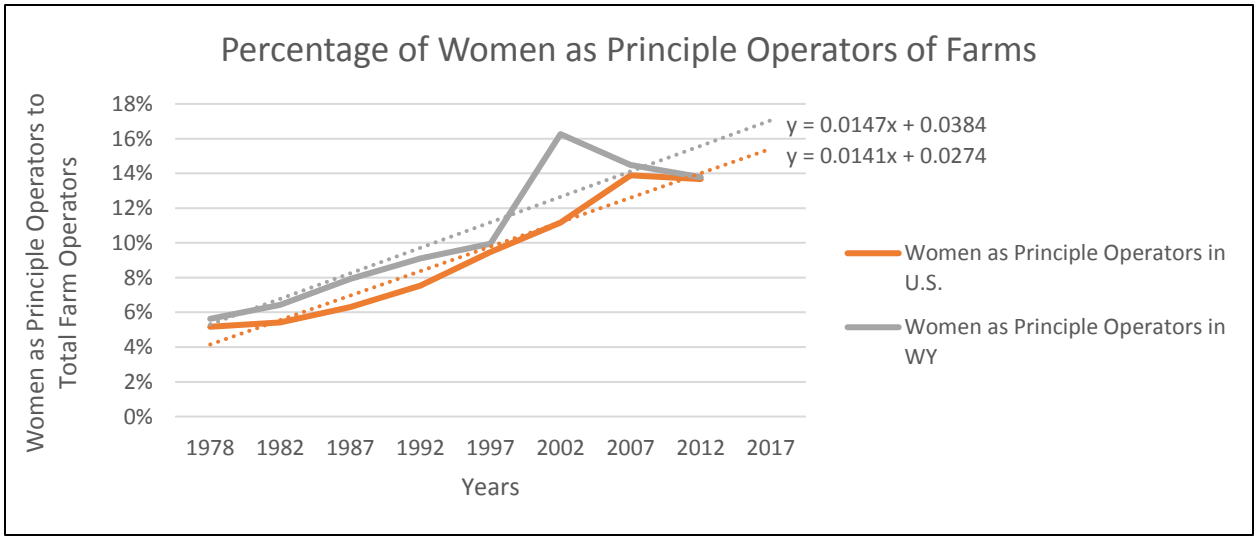

Figure 1.

Bachelor's, Master's, and Doctorate Degrees Conferred to Women

At the Bachelor's Degree level at the University of Wyoming, the number of Agricultural Degrees awarded to women has increased substantially from 1977 to 2016 while the number of Agricultural Degrees awarded to women at the Master's level has increased at a similar pace. The number of Agricultural Degrees awarded to women at the Doctorate level, however, has increased far more rapidly. In reference to Figure 2, Agricultural Doctorate Degrees achieved by women are increasing at 1.3% per academic year while Agricultural Bachelor's Degrees and Master's Degrees are only increasing at a rate of 0.57% and 0.75% per academic year, respectively. It is noteworthy that over the first two academic years in which data was collected by the Office of Institutional Analysis at UW, only men received Agricultural Doctorate Degrees (therefore, zero women). As of the 2003-2004 academic year, however, a monumental 83.33% of Agricultural Doctorate Degrees were conferred to women. While the data has most certainly fluctuated over the past forty years, it can be determined that the rate at which women receive Agricultural Bachelor's Master's and Doctorate degrees from UW will continue to increase over time.

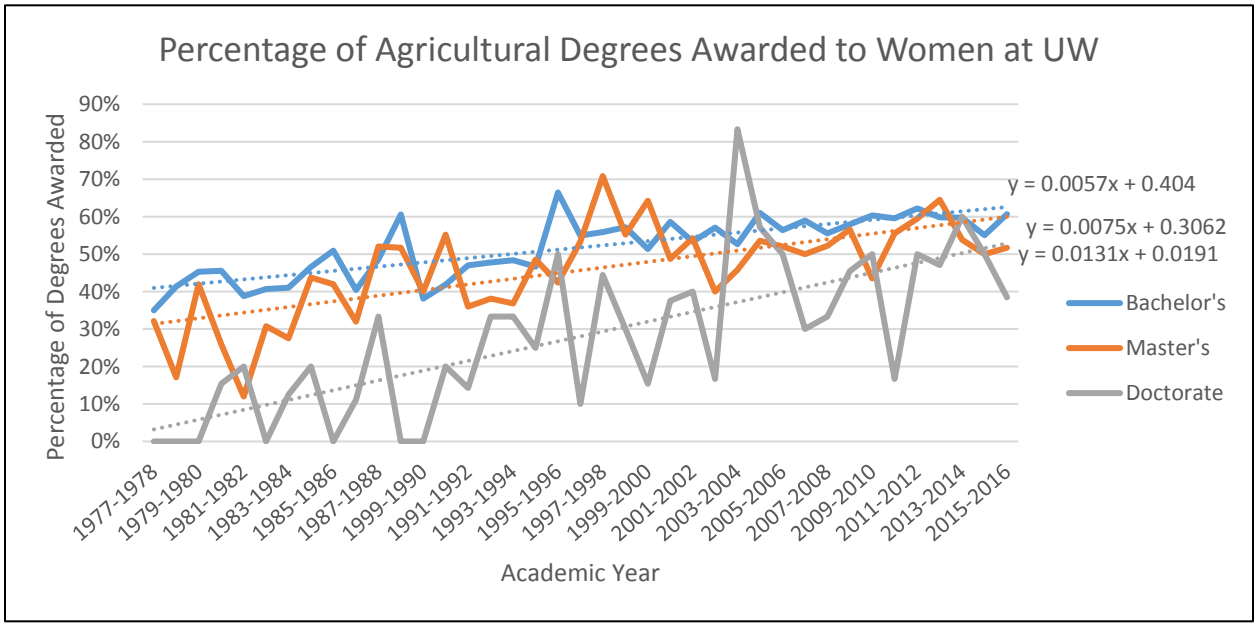

Figure 2.

Meanwhile, women have also been awarded more Agricultural Bachelor's, Master's and Doctorate Degrees at the national level as well. In fact, the rate at which women are achieving Agricultural Master's Degrees is increasing more quickly than the rate at which women are achieving Agricultural Bachelor's Degrees across the U.S., as shown in Figure 3. Specifically, Agricultural Master's Degrees are increasing at a rate of 1.1% per academic year while Agricultural Bachelor's Degrees are increasing at rate of only 0.73% per academic year. Although there are less Agricultural Doctorate Degrees across the U.S. conferred to women compared to Bachelor's and Master's Degrees, the percentage of degrees achieved by women compared to all Agricultural Doctorate Degrees awarded has been increasing at a faster pace than that of Agricultural Bachelor's Degrees.

With the interpretation of trend lines represented in Figure 3, it can be determined that Agricultural Bachelor's, Master's, and Doctorate Degrees conferred to women in the U.S. will continue to increase. It can be further determined that the rate at which Agricultural Master's Degrees are awarded to women will increase at a faster pace than the rate at which Agricultural Bachelor's Degrees are awarded to women.

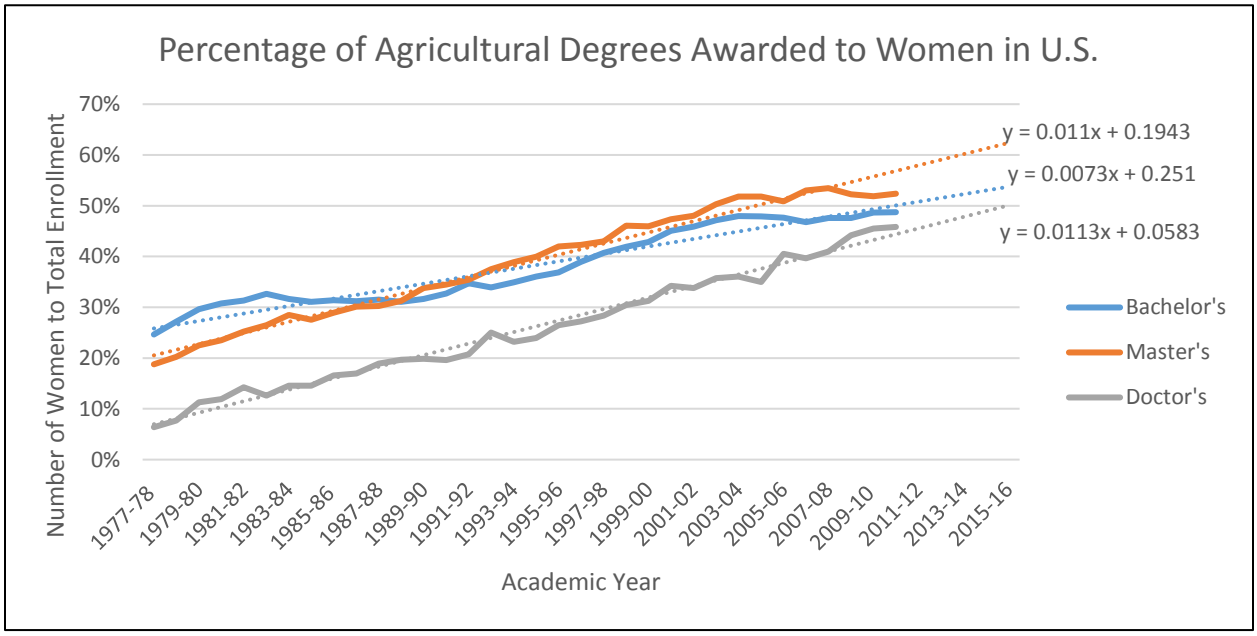

Figure 3.

Comparing the rate at which Agricultural Degrees are conferred to women at UW between the U.S. indicates that there are more women in Wyoming receiving Agricultural Bachelor's Degrees than the rest of the country. Although there have been more women to receive Agricultural Bachelor's Degrees at UW as compared to men, the rate at which Agricultural Bachelor's Degrees are awarded to women across the U.S. has increased at a higher rate than that of UW. Referencing Figure 4, the percentage of Bachelor's Degrees in Agricultural fields at UW has increased at rate of 0.57% per academic year while the percentage of Agricultural Bachelor's Degrees in the U.S. has increased at 0.73% per academic year.

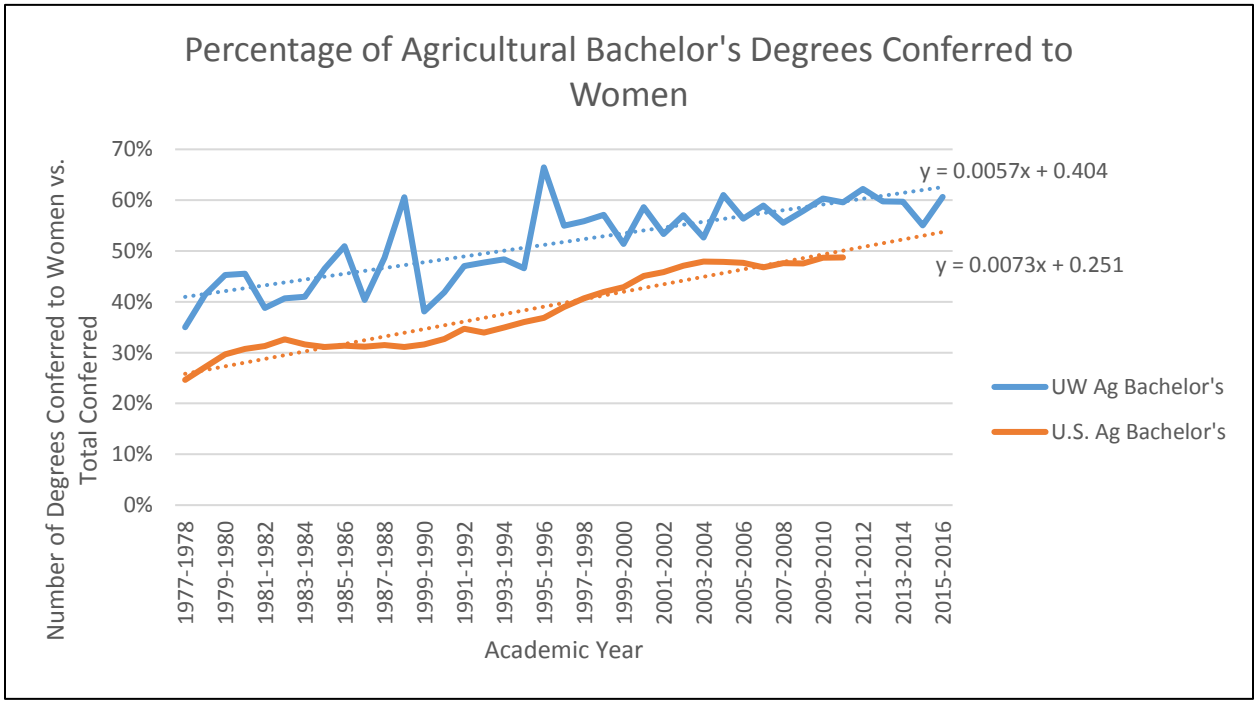

Figure 4.

A much more striking distinction exists between the rate at which Agricultural Master's Degrees are conferred to women at UW compared to the U.S. There have historically been a higher percentage of women at UW receiving Agricultural Master's Degrees than that of the U.S., but between the 2008-2009 and 2009-2010 academic years, the rate at which Agricultural

Master's Degrees are conferred to women across the U.S. passed the rate at which Agricultural Master's Degrees are conferred to women at UW. According to Figure 5, it can be interpreted that the rate at which Agricultural Master's Degrees are awarded to women across the U.S. will continue to increase at 1.1% per academic year while the rate at UW alone will continue to increase at 0.75% per academic year.

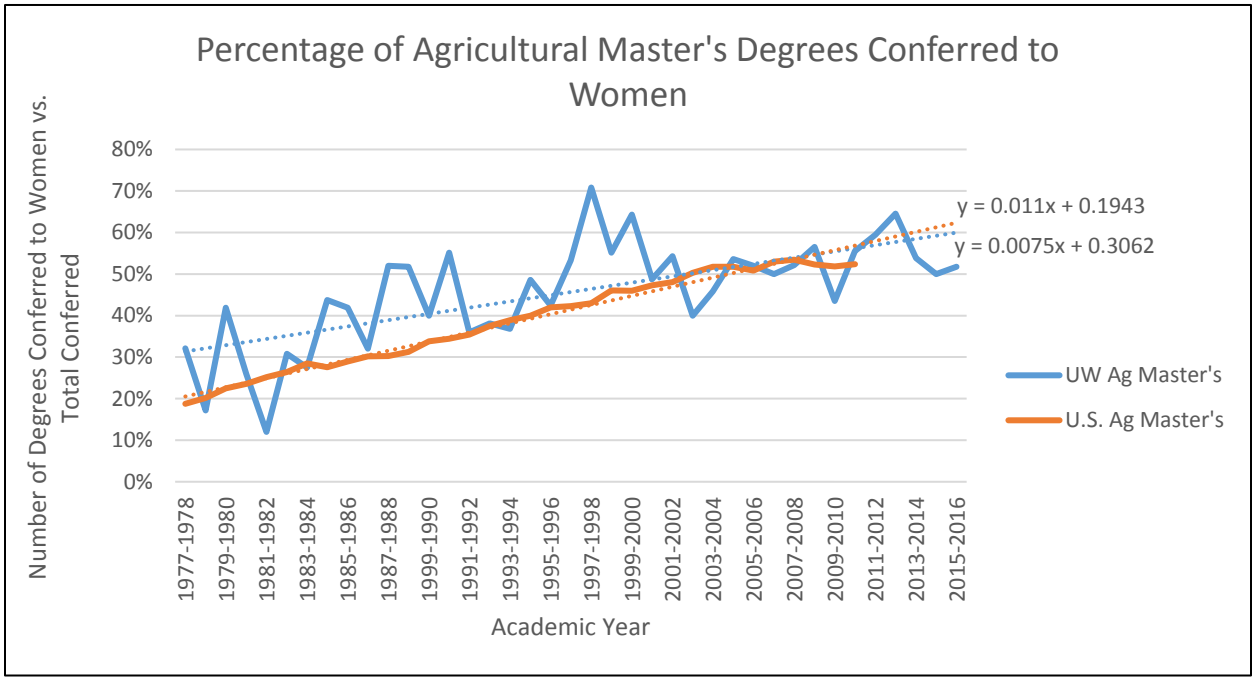

Figure 5.

Contrary to the results interpreted of Agricultural Master's Degrees, the rate at which Agricultural Master's Degrees are conferred to women at UW passed the rate at which Agricultural Master's Degrees are conferred to women across the U.S. circa the 1999-2000 academic year. Specifically, the rate at which Agricultural Doctorate Degrees are awarded to women attending UW has increased at 1.3% per academic year while the rate of the percentage at which Agricultural Doctorate Degrees received by all women in the U.S. has increased at 1.13% per academic year since 1977. Thus, it can be determined that these trends will continue in the future.

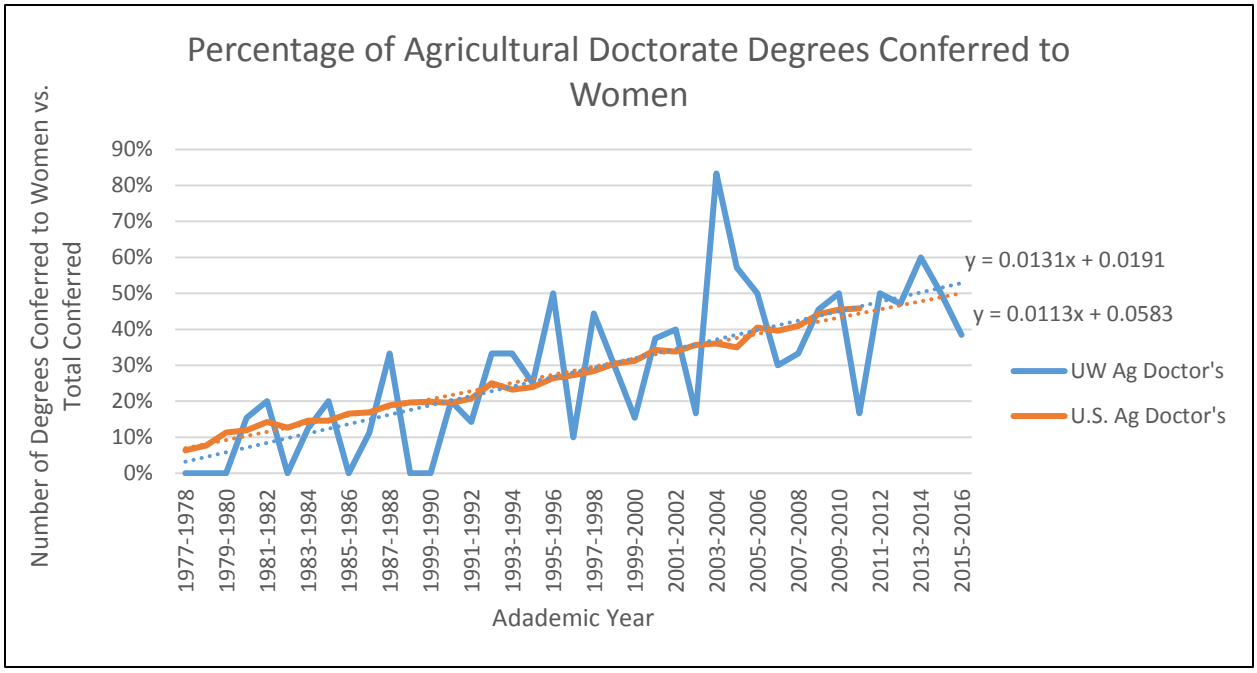

Figure 6.

Women as Faculty Members of Agricultural Programs

Further interpreting Figure 6, it can be shown that between 1977 and 2016, the number of women with Doctorate Degrees across the U.S. as well as in Wyoming has increased at rates of 1.13% and 1.31% per academic year, respectively. Furthermore, the percentage of women faculty members in Agricultural-related fields, who have been conferred their Doctorate Degree from UW, has increased at 1.31% per academic year. As of the 1977-1978 academic year, only 6.385% of agricultural faculty members constituted as women in the nation. As of the 2015-2016 academic year, however, 45.827% of agricultural faculty members were women. Therefore, it can be determined that the rate at which women are becoming involved in agriculture through employment in faculty positions will continue to increase at a rate of 1.13% per academic year.

Women have not only increased their share of the labor force in faculty employment of Agricultural Programs, but in all doctorate programs across the U.S. as well. The rate at which women have held faculty positions in the U.S. has increased at a rate of 0.73% since 1977. In

comparison, women held only 6.385% of agricultural faculty positions as of the 1977-1978 academic year while women held only 23.89% of faculty positions across all degree fields. This highlights the historical quantitative discrepancy between genders in faculty positions labor force overall, and more relevantly, in the agricultural faculty labor force. Fast-forward to the 2010-2011 academic year when women held 45.827% of agricultural faculty positions and held 51.36% of faculty positions overall. Thus, it can be determined that women will continue to increase involvement in agriculture through their share in the faculty labor force at a rate of 1.13% per academic year going forward.

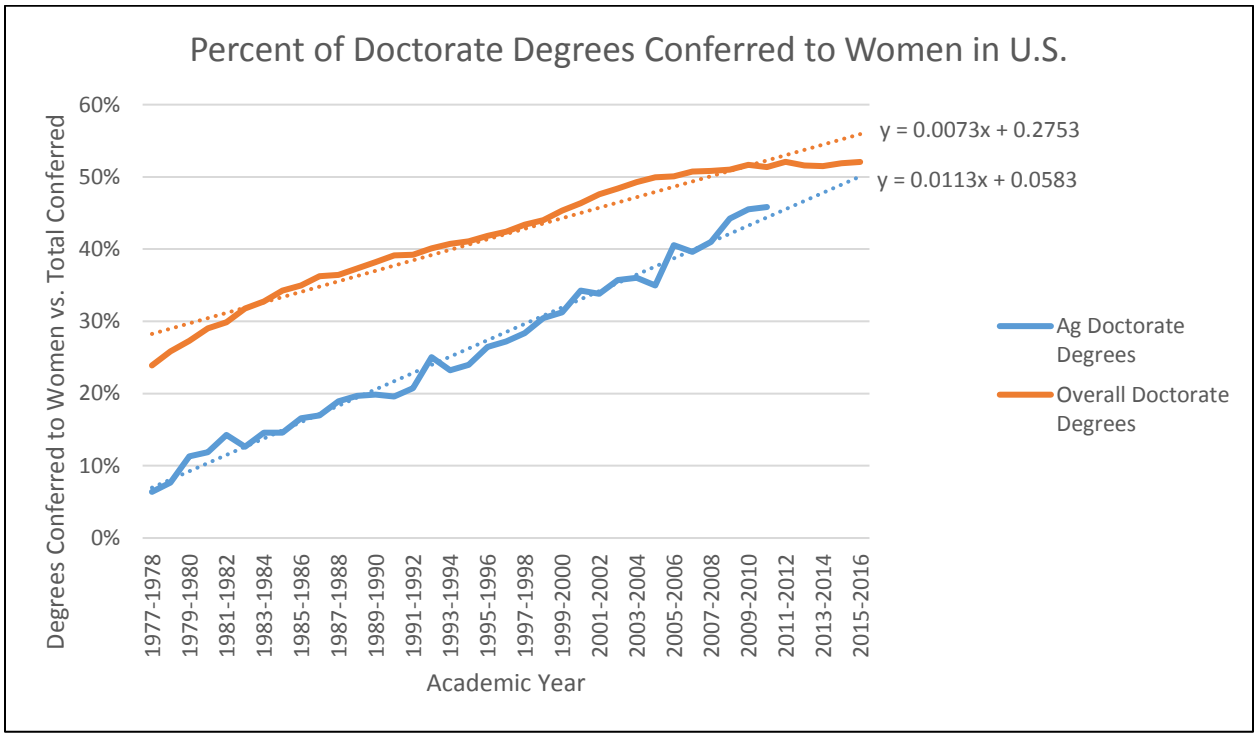

Figure 7.

Conclusions

If current trends continue to increase at the rates interpreted through this research, it can be concluded that women's prevalence in agriculture will become extremely substantial. The rate at which women are becoming principle farm operators, earning Agricultural Bachelor's, Master's, and Doctorate Degrees, and potential faculty employment have increased significantly since 1977 and most likely will continue to rise.

Women have increasing power to offer new perspectives to the industry, especially in the aspects of data configuring, analysis, marketing, information technology and management, as these encompass the emphasis on business management in production agriculture (Schafer, 2012).

The outlook for women in the agricultural industry is extremely positive, and as gender roles in society continue to evolve, their prevalence is increasingly essential to the future of agriculture.

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