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China: Animal Agriculture

## **China: Improving Beef Cattle Reproductive Efficiency**

When my sister was a freshman in college, she took a trip to China. When she came back, she told my family and me all about the trip. It was interesting to hear about all the strict rules the Chinese government puts on the people. They can't use social media like Facebook and Instagram. She also showed us pictures of the livestock the Chinese raise. I was surprised when she showed us the pictures of their beef cattle. They did not look like the cattle I see in the United States and they were not in pastures like the cattle my family raise.

People have lived in China for many years. In fact, there are records dating back to almost 4,000 years ago (BBC News). China was once under total communist rule before it transitioned to socialism by Mao Zedong (BBC News). Today, 1.4 billion Chinese are under the rule of President Xi Jinping (BBC News). The four main religions are Buddhism, Christianity, Taoism, and Islam (BBC News). The people speak Mandarin and live to be about 75 to 78 years old (BBC News). The total area of China is 3.7 million square miles (BBC News). China is the most populous country on Earth, but not the largest in land mass (Synan).

Some say the communist rules still exist in China. In 2017, the government made cyber security laws stricter by controlling more data of domestic and foreign companies (BBC News). In 2018, the country removed the president's two-term limit. Since 1990, China's economy has been slowing in growth (BBC News). Until 2015, China had a one-child policy (BBC News). This meant parents could only have one child and if they were caught with more than one, abortions and sterilizations could occur (Kenton). In 2014, the average family size was 3.02 people (Cheng).

China is home to the world's largest population (Hackett). Of the 1.4 billion Chinese, approximately 8.7% of them are greater than 65 years old (World Health Organization). Additionally, approximately 51.8% of Chinese live in urban areas (World Health Organization). By 2022, 76% of China's population will be middle class (Iskryan). The predominately young population, growing middle class, and large urbanization is creating a recipe for a disaster. This disaster is more people and a greater need for goods. The greatest problem lies in feeding these people and their new taste for food, specifically animal proteins.

China beef production for 2017 was projected to be 7.0 million tons (USDA Foreign Agricultural Service). In comparison, the U.S. is estimated to produce 12.4 million tons in 2018 (Good). In

2017, consumption of beef in China grew 20% to reach 7.8 million tons (Good). By the end of 2018, it is estimated China will import 1.13 million tons of beef (Stotts).

The rise in consumption is largely due to the growing middle class in China (USDA Foreign Agricultural Service). Two provinces, Henan and Shandong, are the largest beef producing provinces (USDA Foreign Agricultural Service). These two provinces account for 22% of Chinese beef production (USDA Foreign Agricultural Service). In China, the top four beef producers share 1% of the total market, while in the U.S. the top four beef producers share 75% of the total market (USDA Foreign Agricultural Service).

A quick solution the Chinese look to in order to meet this growing demand is slaughter a large amount of dairy cattle. This is because small dairy farms cannot compete against large dairies in China (USDA Foreign Agricultural Service). However, these small dairy farms will run out of cattle to slaughter and dairy cattle carcasses are not high quality. Therefore, to improve beef cattle reproductive efficiency, the Chinese should use embryo transfer to produce more calves per year, bring in new genetics, and keep herds small.

In China, Yellow cattle are the most popular breed of beef cattle and account for 70% of beef production (Peel). Yellow cattle are a native breed but take two to three years to produce a calf (Peel). In the United States, it takes nine months for a cow to produce a calf. Embryo transfer increases a cow's reproductive efficiency and allows a cow to produce more than one calf per year. Additionally, embryos can be profiled to improve conception rates (Kober). Through embryo transfer, my family uses selected genetics in the breeding of our livestock. The use of embryo transfer allows beef producers to quickly increase the genetics of favored traits in their herd.

There are six steps for a successful embryo transfer. The first step is the selection of semen that you want to introduce to your herd. The second step is the selection of high-quality eggs. Almost 85% of donor cows will disperse five transferable eggs (Troxel). The third step is to breed the cow. This is done through artificial insemination which is installing semen into the female's reproductive tract. The fourth step is the flushing of the embryo. This is the process of inserting fluid into the reproductive tract and flushing fluid out, which ends up in the collection vessel. This process separates the embryos. The fifth step is evaluating the embryos. They are inspected under a microscope. This process looks at their success rate. The embryos are given a two-number classification based on their developmental stage and quality grade (Fears). The last step is inserting the embryo into the recipient. This is where the embryo will grow for the next nine months, the average pregnancy for a cow in the United States. It is important to make sure the recipient maintains an appropriate body score and receives adequate food, water, and minerals during her pregnancy.

Another advantage of embryo transfer is the ability to bring in new genetics. Yellow cattle are popular in China because they can withstand the Chinese climate and terrain (Peel). These cattle also have a large body confirmation and are used as draft power (Qiu Huai, Ju Zhiyong and

Chang Zhijie) However, the cows have small udders. Therefore, to increase maternal traits, the Chinese should consider incorporating Shorthorn, South Devon, Gelbvieh and other types of high milk productivity, maternal traits into their herd. Using these traits will allow Chinese cattle producers to bring new genetics into the country to improve herd traits. Through using embryo transfer on our cattle operation, it has provided our cattle many different benefits. For instance, this past summer I had a steer I exhibited, which my family raised using embryo transfer. With embryo transfer we crossed Charolais and Chianina genetics. This made my steer have an ample amount of muscle with the Charolais genetics, but also moved efficiently on his feet and legs with the Chianina genetics. This made him a good candidate for a high-quality carcass. This example shows why countries like China should use embryo transfer to bring new genetics to their herd, which will improve the quality of animals, and the rate of reproduction.

When making a breeding decision it is important to consider genetic worth, economic value, and reproductive potential of the donor female (Fears). It is important to choose good genetics, but it is also important to make sure the recipient chosen has no less than a body condition score of 4 and is vaccinated and dewormed (Fears). One may run the risk of lower pregnancy rates if the following breeding decisions are made: use of sexed semen, not enough semen used, cow has not been bred in more than two years, recipients came from unknown source, and recipients are known to lose calves (Fears). By recognizing these potential risk factors and decreasing or eliminating them one can increase the success rate of embryo transfer.

Finally, another advantage of incorporating embryo transfer into Chinese cattle herds is Chinese cattle producers do not need to increase their herd size. Most Chinese cattle producers own less than 10 head of cattle (Peel). On average, most Chinese cattle producers only keep their herd bull for six years (Qiu Huai, Ju Zhiyong and Chang Zhijie). Embryo transfer can keep herds small. It is estimated there are 150,000 eggs in one cow (Troxel). By using embryo transfer with artificial insemination, those possibilities increase. Additionally, embryo transfer is cost efficient. In the U.S., the minimum cost per pregnancy is \$250 (Troxel). Compare this number to purchasing a cow, a bull, feed, and other costs. Embryo transfer is a great purchase, especially for small farmers. With our ranch having 60 cows, using embryo transfer allows us to have more than 100 different combinations of genes. We use outsourced genetics and our own genetics to make various types of different coded DNA. This is important because we use different types of genes which provide specific traits to grow our herd in genetic diversification. I learned how to do embryo transfer because specific cows in our herd had specific traits that my family wanted to expand on, and I was involved in the breeding decision process

The advantages of embryo transfer prove this is an appropriate solution for Chinese beef producers. Due to embryo transfer not requiring Chinese cattle producers to increase their herd size, this allows producers to carry on with much of the status quo in their current life. Additionally, because the population of China keeps growing and land is not readily available, maintaining herd size is an important principle for Chinese agriculture. In my view, it would not be in China's best interest to bring in lots of live animals to improve cattle genetics, thus increasing herd size. In addition, the process would be lengthy with transportation, and

quarantine regulations. By allowing embryo transfer companies and universities to educate cattle producers, they will be better understanding how to implement the technology and make breeding decisions best for their herd.

Due to current government relations between the United States and China, I would not suggest foreign aid from the United States to assist China with these changes at this time. However, the Chinese should recognize embryo transfer is a viable solution to increase sources of protein for a growing country. Chinese universities should consider extension programs to help educate the people on this technology. Additionally, companies should consider investing in embryo transfer technology to help make it more affordable and readily available for Chinese cattle producers. Developed countries, including the United States, should consider going on agricultural missions to China to help educate their cattle producers on how to select good cattle genetics and apply embryo transfer to their herds. To feed the world's population by 2050, agriculturalists will need to produce 70 percent more food than was is grown today (Shearing). This problem will require all hands-on deck to make sure no one goes to bed hungry. By turning to technology, such as embryo transfer, Chinese cattle producers can do their part in feeding the world.

National Public Radio wrote an article titled, "America's Elite Cows Don't Give Birth— Their Surrogates Do" (Wendle). This title is just one example of how technology has changed the agricultural industry for the better. To think, for example, an eight-year-old cow can have more than seven offspring in her current lifetime was unimaginable during my grandparent's childhood. The United States has capitalized on embryo transfer in their beef industry, it is now time for China to do the same.

In closing, for China to improve beef cattle reproductive efficiency, they should use embryo transfer. Embryo transfer allows a cow to produce numerous calves per year, brings in new genetics, and embryo transfer keeps herds small. These recommendations will allow more beef cattle to be produced in China which will allow more beef in the stores for Chinese to buy. I hope that I will have the opportunity to travel to China one day just like my sister did when she was in college. I may even have the chance to see how embryo transfer has changed the Chinese cattle industry. In the meantime, my family and I plan to keep on using embryo transfer to improve and retain good beef cattle genetics in our herd.

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