

**Comparison of Profitability Jerseys vs. Holsteins, Including Benchmarks
Comparisons for Production, Reproduction, Health and Costs of Production.**

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by

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ABSTRACT

The objective of this study was to determine whether the Jersey Breed is economically more feasible than the Holstein Breed on Rancho Teresita Dairy in Tulare. Beginning In March of 2011 the dairy purchased 380 milking Jersey cows. The dairy decided to purchase Jerseys because in 2008 the ethanol mandate started, causing the feed prices to climb. This study evaluated reproduction, calving ease, production, and feed efficiency. Jersey heifers are bred for the first time at 12 months and Holstein cows are bred for the first time at 14 months. The Jersey cows have a higher overall conception rate (CR) of 32% vs. 29% CR of a Holstein cow. Because the Jersey breed has an easier time getting pregnant we see that they also have a higher pregnancy rate of 25% over the Holstein cows at 20%. Jersey cows are bred back after calving around 66 days and Holstein cows at about 69 days. Production has a direct relationship with reproduction. Holstein cows produce an average of 76.91 lbs./day vs. Jerseys with lower number of 59.27 lbs./day. The composition of the milk varies between breeds. Holstein milk has 3.57% fat, 3.03% protein, and 8.78% solids-not-fat. Jerseys on the other hand have 4.98% fat, 3.66% protein, and 9.42% solids-not-fat. Although Holstein cows produce a greater volume, Jersey's have a much better composition. Energy Corrected Milk (ECM) allows for the Jersey milk to be on equal grounds as the Holstein milk. After energy correcting the milk the Holstein herd had an average ECM of 77.24 lbs. and the Jersey herd had an average ECM of 72.31 lbs. Lastly the feed efficiency (FE) was calculated, the average FE for Jersey cows is 1.61 and for Holstein cows is 1.38. The evaluation was helpful for the dairy by comparing the efficiency of the two breeds.

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INTRODUCTION

Over the past 10 to 15 years dairymen have continued to convert from commercial Holstein to commercial Jersey herds. Numbers of Jerseys have increased from about 5% of the total population to over 10% of the population of dairy cattle. This topic was selected because this trend is affecting the dairy industry tremendously. With ever increasing feed cost dairy farmers are making the move towards the Jersey Breed because they are potentially more efficient than the Holstein breed. Therefore, the income over feed cost ratio may be much higher for that of the Jersey Breed making them a better option for Dairymen.

Rancho Teresita Dairy has been a strong advocate for the Holstein breed for the past 20 years. This project was a good fit for this dairy as they have tried numerous other things to be more cost effective and economically sound. It was also the first of many to start the transition from Holstein to Jersey's in the Tulare area. All animals on the operation are handled in the upmost care to ensure that they are as comfortable and healthy as possible. With this project came the opportunity for dairymen all over the world to see an upside to the higher feed cost. I will be looking at pregnancy rate, milk production, profitability, and most importantly income over feed cost. The objective of this study was to determine whether the Jersey Breed is economically more feasible than the Holstein Breed on Rancho Teresita Dairy in Tulare

REVIEW OF LITERATURE

The Holstein and Jersey breeds have become the top dairy breeds in the United States. Their popularity has come because Holsteins have dominated the dairy industry due to their high milk production and, because of their efficient cheese production Jerseys are the second most popular breed in the United States and account for 7% ("Dairy Production", 2012) of the US dairy population. The popularity is primarily due to the two breeds having the ability to convert large quantities of forage-based diets into milk and milk components.

Reproduction

In evaluating reproduction there are many different pieces that need to be in order to ensure that your dairy operation runs smoothly and is profitable. Milk is often a direct result of reproduction efficiency. Having more fresh cows, more often, means more milk. The first of these is days to first breeding after calving (DFB), after the voluntary waiting period, the sooner the cow gets bred back the better. In 2007 the Holsteins were being bred back at 85 days, while the Jerseys were being bred back at around 83 days (Norman et al., 2009). Days to last breeding, (DLB), allows you to see how long it is taking to get the cows pregnant. It is desirable for DLB to be low; in general for Holsteins this number averages about 144 days. For Jerseys, this number decreases by 15 days, with an average of 129 days (Norman et al., 2009). To coincide with the previous two aspects is breeding's per lactation (NB); this is how many times a cow is bred in a lactation before becoming pregnant. Holsteins tend to have a slightly higher, 2.5, while Jersey's sit at a lower number of

2.3(Norman et al., 2009). For all three of these pieces the lower the number the more successful the operation will be.

Conception rate (CR), pregnancy rate (PR), and calving interval (CI) are also three key factors in ensuring the success of your dairy farm. Conception rate, allows for the dairyman to see how many of his cows are getting pregnant in relation to how many times they have been bred. This number varies a great deal depending on how old the cow is and how many lactations she has already been through. In a study of 23,000 herds Holsteins, on average, in the first breeding had a 28.5% CR, second breeding 29.17% CR, third breeding 28.83% CR, fourth breeding 27% CR, and in the fifth breeding 25.83% CR (Norman et al., 2009). In the same study Jerseys, on average, in the first breeding had a 37.5% CR, second breeding 35.16% CR, third breeding 32.83% CR, fourth breeding 29.5% CR, and in the fifth breeding 27.17% CR. In all five of the breeding's Jerseys have a higher CR; which is a more desirable trait (Norman et al., 2009).

Right along with CR, comes the PR, which is a percentage of non- pregnant cows that become pregnant during each 21-day period. The value of a new pregnancy has been reported to average approximately \$200 (Eicker and Fetrow, 2003). An analysis of all DHIA Holstein herds in Florida and Georgia showed that average pregnancy rates in 1998- 2000 were 17% (De Vries et al., 2005). On the California Polytechnic State University dairy the pregnancy rates go as follows: Jersey cows have a 27% pregnancy rate and the Holstein cows sit at a lower number of 21% pregnancy rate (DHI-Plus Computer Software). The average value of a new pregnancy, in an average Holstein herd was, \$278 and the average cost of pregnancy

loss by was \$555 (De Vries, 2006). The value of a new pregnancy increased with DIM early in lactation and then on average, decreased later in lactation (De Vries, 2006). All of these aspects from DFB to PR monitor and ensure an appropriate calving interval (CI). CI is the interval between successive calving's of a specific cow. In 2006 the average CI for Holsteins was 422 days and in Jerseys was 410 days (McAllister, 2013).

Calving Ease

Calving ease and neonatal calf mortality are economically important traits in the dairy business. An easy calving is one that does not require assistance and does not impose undue strain on the calf. The amount of stress is often affected by high calf birth weight, calving difficulty, and calf mortality (Olson et al., 2009). Calving difficulty has been linked with reduced survival of both the cow and calf, as well as lower production, fertility, and longevity for the cow (Dhakal et al., 2013). For births that require assistance during calving, additional cost estimates range from \$96.48 to \$397.61, depending on the type of assistance needed (Dematawewa and Berger, 1997).

Calving ease can also be associated with whether it is the heifers first time calving or if the cow has had multiple births. Out of 51 observed births of primiparous, meaning giving birth for the first time, 21.6% of Holstein heifers required assistance while calving, 15.7% were dead on arrival, and the mean weight of these births was 34.0 kg (Dhakal et al., 2013). Out of 40 observed births only 7.5% in primiparous Jersey heifers required assistance, 12.5% were dead on arrival,

and the mean weight of these calves was only 25.0 kg (Dhakal et al., 2013). In multiparous cows these numbers don't change much, but there is a difference (Dhakal et al., 2013). Out of 139 multiparous Holstein cows 7.2% needed assistance, 12.9% were dead on arrival, and the mean birth weight was 36.6 kg. Finally, out of 89 multiparous Jersey cows 3.4% needed assistance, 5.6% were dead on arrival, and the mean birth weight was 25.0 kg (Dhakal et al., 2013). A possible factor influencing reproductive performance is calf size. As stated previously Holstein calves had a higher mean weight than that of the Jersey calves. Research in North Carolina determined Jerseys produce female calves equal to 5.5-5.6 percent of dam's weight, while Holsteins produce female calves equal to 5.8-6.5 percent of dam's weight. Research results indicate Jerseys are more efficient in reproductive performance (Underwood, 2002).

Production

All aspects of the dairy are important, but the one that they all are leading to is the production side. The average production for Holstein cows was 23,385 pounds of milk ("History of the Holstein Breed.") and Jerseys only averaged 16,997 pounds of milk in a year. Holsteins may produce more milk than a Jersey, but a Jersey cow produces more dense milk.

Holstein and Jersey cow breeds have different compositions to the milk that they produce. This meaning that these two breeds produce milk that have different levels of milk fat, solids-not-fat, and protein all adding up to the total solids of milk. The total solids of milk produced by a Holstein cow are 12.4% versus 14.6% for Jerseys. Holsteins produce less milk fat 3.8% vs. 4.8% (Capper and Cady, 2012)

solids-not-fat 8.7% vs. 9.5% (Stallings) and protein 3.1% vs. 3.7% (Maurice-Van Eijndhoven et. al., 2011) (Capper and Cady, 2012). Lactose and other components (mainly minerals) did not tend to be drastically different (Maurice-Van Eijndhoven et. al., 2011) (Stallings). Based on this information Jerseys appear to have a greater nutritional value in their milk.

Feed Efficiency

Holstein cows have a total annual feed cost of \$107,514 per 100 cows and Jersey cows have a lower total feed cost of \$84,205 per 100 cows (Holstein Association). Feed efficiency can be defined as pounds of milk produced per pound of dry matter consumed. Energy efficiency has been shown to be similar in Jerseys and Holsteins in early lactation, but differs in the second trimester of lactation (Blake et al., 1986). In a 1985 study of feed efficiency of Holstein and Jersey Cows it was found that Jersey cows have the advantage of higher ratios of milk to body weight and feed intake was less than that of a Holstein cow (Blake et al., 1986). A study published from Texas A & M evaluated comparative feed efficiencies between Jerseys and Holsteins. Holstein cows consumed 3.4 percent of their body weight in first trimester, while Jerseys consumed 3.6 percent, and in second trimester the Holsteins declined to 3.0 percent, while the Jerseys increased to 3.7 percent (Underwood, 2002).

A nutritionist-expert from Denair, CA, James K. Tully stated that, "Jerseys are able to capture the energy that they eat over-and-above their body weight, and put it into milk... [this] means we're able to get more pounds of ECM (energy corrected

milk) per pound of dry matter than the Holsteins would give. From what we've seen, the numbers approach 1.6 lbs. ECM per pound of intake for a Jersey versus number like 1.45 to 1.5 of Holstein (Tully)."

Sustainability

Greenhouse gases have been at a steady increase throughout the twentieth century, these increases have been said to cause a steady increase in the atmospheric temperature and other changes to the climate (Rotz et al, 2010). The dairy industry has been making significant progress in reducing the environmental

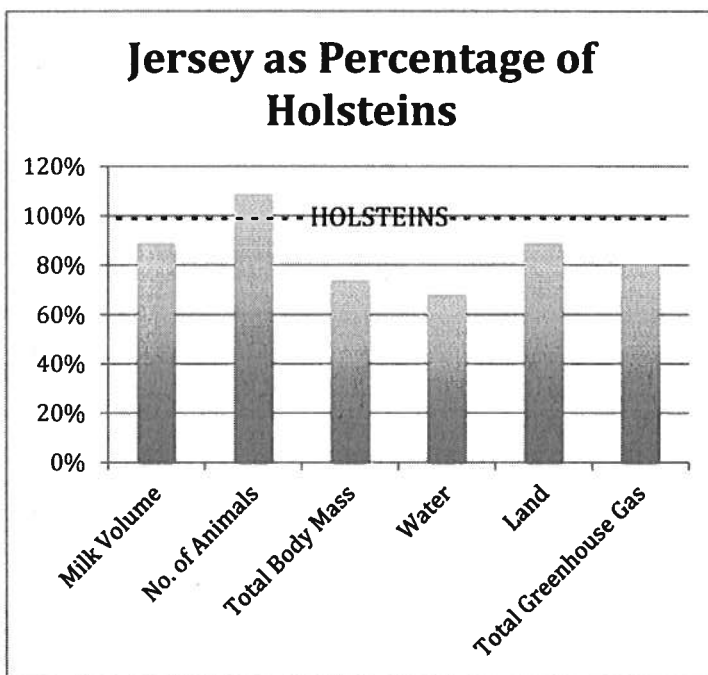


Figure 1: Jerseys as Percentage of Holsteins

impact of milk production.

There was a 63% decrease in the carbon footprint per unit of milk from 1944 to 2007 (Capper et al., 2009).

Although the dairy industry as a whole has been making great strides to improve the environment, there has been major efforts to prove that Jersey cows are more

environmentally friendly.

In a life-cycle assessment study of Jersey and Holstein cows presented by Dr. Jude Capper of Washington State University determined that for the production of the same quantity of protein, milk-fat, and other solids, the Jersey population needs

32% less water, requires 11% less land, produces less waste and uses substantially less fossil fuels with a 20% reduction in total carbon footprint. In terms of the amount of Jersey milk needed to produce 500,000 metric tons (1.1 billion pounds) of cheese, the reduction in carbon footprint is equal to taking 443,900 cars off the road annually ("NAJ").

MATERIALS & METHODS

Background

The data was collected at Rancho Teresita Dairy (RTD) in Tulare, California. The dairy began milking in October of 1990 and has been family owned and operated since then. The dairy started as a primarily Holstein dairy up until 2012. In March of 2011 the dairy purchased 380 milking Jersey cows. The dairy decided to purchase Jerseys because in 2008 when the ethanol mandate started, causing the feed prices to climb. Currently there are 3,251 Holstein cows and 896 Jersey cows that are being milked. The cows are milked in a double 25 parallel, there were no changes made to the barn when the Jerseys were purchased. The Jersey cows are milked 3x/day and the Holsteins are being milked 2x/day. Breeding for the Holstein cows is done with conventional semen. Breeding for the Jersey heifers is done with sexed semen on first service.

Reproduction

Reproduction is one of the main aspects of a dairy that determine its success. Jersey heifers are bred for the first time at 12 months and Holstein cows are bred for

the first time at 14 months. Jersey cows are being bred earlier because they will be producing a smaller calf, and there will be less stress on the animal. Jersey cows at Rancho Teresita Dairy have a little harder time getting pregnant, than the Holsteins, the first time with a conception rate of 56%. Holstein heifers on first breeding have a conception rate of 60%. However, this changes as lactation number increases. The Jersey cows have a higher overall conception rate of 32% (At first lactation 34%, and at lactations greater than one, 31%). Whereas the Holstein cows sit at a slightly lower number of 29% overall conception rate, at first lactation 30%, and at lactations greater than one 28%. This leads to how many cows in the herd, that should be pregnant, are pregnant. Because the Jersey breed has an easier time getting pregnant we see that they also have a higher pregnancy rate of 25% over the Holstein cows at 20%.

The dairy has seen that Jersey cows have an easier time after transition period, which allows them to get bred back faster. Jersey cows are bred back after calving around 66 days. Holstein cows, although not much farther behind them, are bred back after calving at about 69 days.

Calving Ease

Upon observation the dairy herd managers have noticed that the Jersey breed has less difficulty calving than the Holstein breed. The exact numbers were unavailable. The Holstein breed had a higher percentage of calves born dead on arrival than that of the Jersey breed. The Holstein breed had a total percentage of 8% DOA, and 11% of all Holstein bull calves born were dead on arrival (DOA) and 5% of all Holstein female calves. The Jersey breed had a lower percentage of calves

born dead on arrival, a total of 4%. 7% of all Jersey bull calves born were DOA and 3% of all Jersey female calves.

Production

The herd is currently producing on average 68 lbs./day. Holsteins are coming out on top with an average of 76.91 lbs./day and Jerseys with a significantly lower number of 59.27 lbs./day. As previously discussed Jersey and Holstein cows produce two different types of milk, each containing different amounts of components. On the RTD the Jerseys are producing milk with a fat percentage of 4.98% vs. 3.57% that the Holsteins are giving. As seen in figure 1, the percentages stay pretty close to the average with the Jersey's highest fat percent being a 5.28% and the lowest at 4.70%, and Holsteins with a high of 3.75% and the low being 3.29%. The Jersey cows also have a higher amount of protein and solids-not-fat

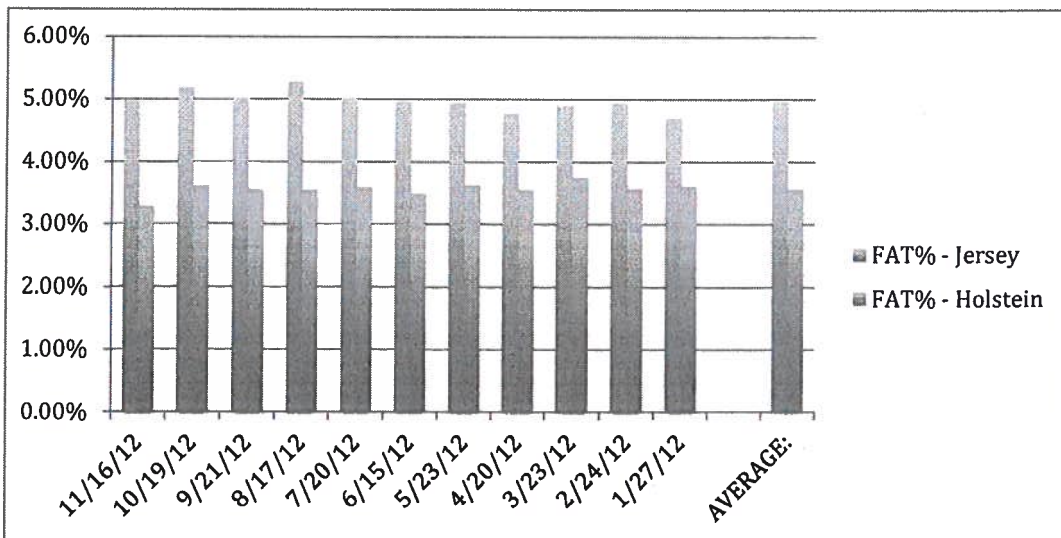


Figure 2: Comparison of Jersey & Holstein Milk Fat %

percentages. As you will see in figures 2: the average protein% for the Jersey breed was 3.66%, with a high of 3.84% and a low of 3.50%. The average protein% for the Holstein breed was 3.03%, with a high of 3.11% and a low of 2.86%.

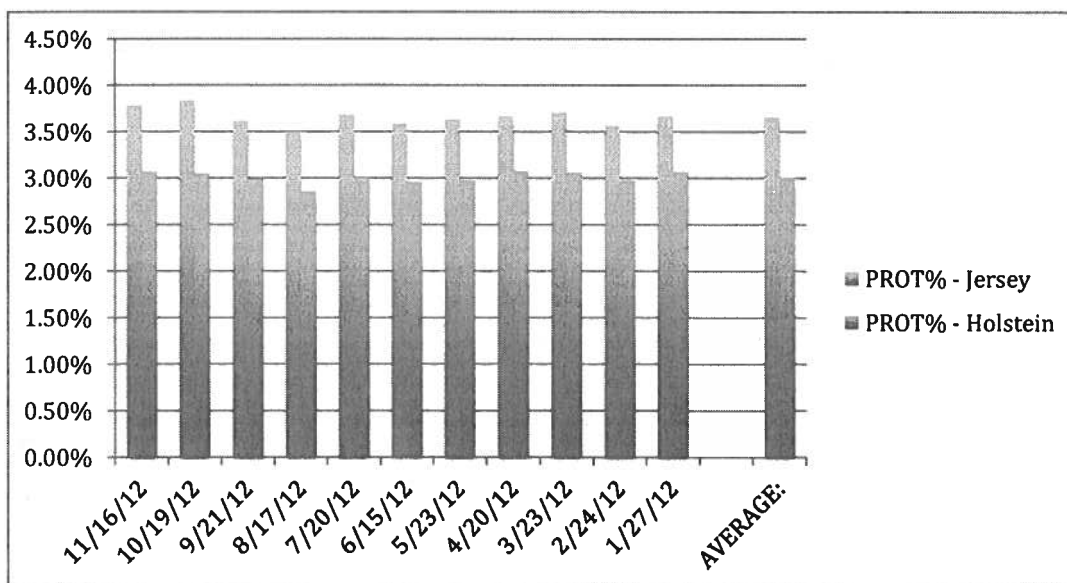


Figure 3: Comparison of Jersey & Holstein Milk Protein %

The average SNF% for the Jersey breed was 9.42% vs. 8.78% for the Holstein breed. The high for a Jersey was 9.59%, with a low of 9.25%. The high for a Holstein cow, which doesn't reach the low of a Jersey cow, was 8.88%, with a low of 8.61%.

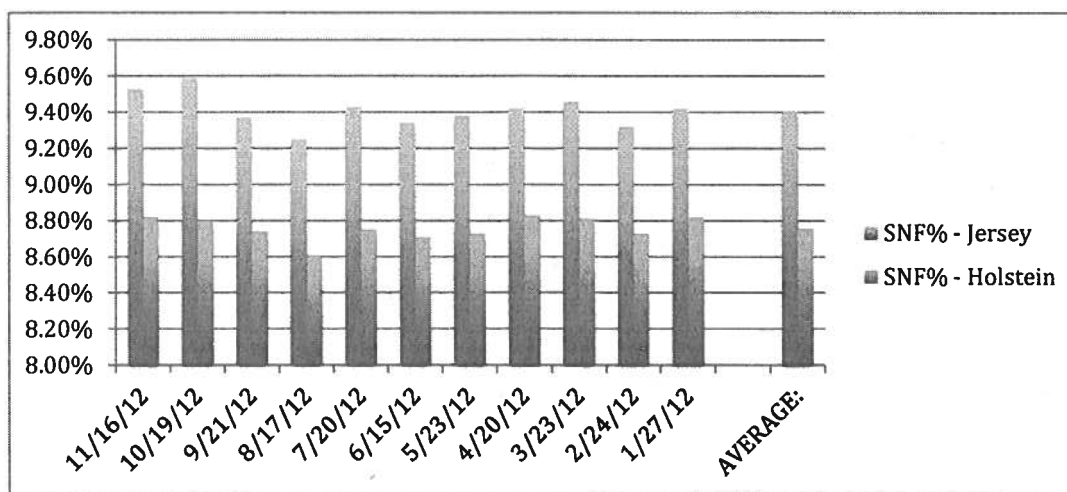


Figure 4: Comparison of Jersey & Holstein Solids-Not-Fat %

Something to note is that, for the most part, the high and low test dates for Jerseys and Holsteins occurred in the same months. As seen in the previous figures (Figures 2-4) Jersey milk is much denser than Holstein milk. Therefore, Jersey milk is offered premiums for the protein in the milk that they produce. In order to receive this premium the tank has to reach an initial 3.5% protein, and then for every 100 pounds of milk over a 3.1% the dairy will receive an extra \$.63 back.

Jersey cows produce significantly less milk than a Holstein cow, in order to compare them on a more equal basis the milk needs to be energy corrected. Energy corrected milk (ECM) determines the amount of energy in the milk based upon milk fat and protein. To determine this I used the equation $ECM = ((0.325 * \text{milk yield}) + (12.86 * \text{milk fat yield}) + (7.04 * \text{milk true protein yield}))$. After energy correcting the milk the Holstein herd had an average ECM of 77.24 pounds and the Jersey herd had an average ECM of 72.31 pounds. Figure 4 shows the ECM on the monthly test dates.

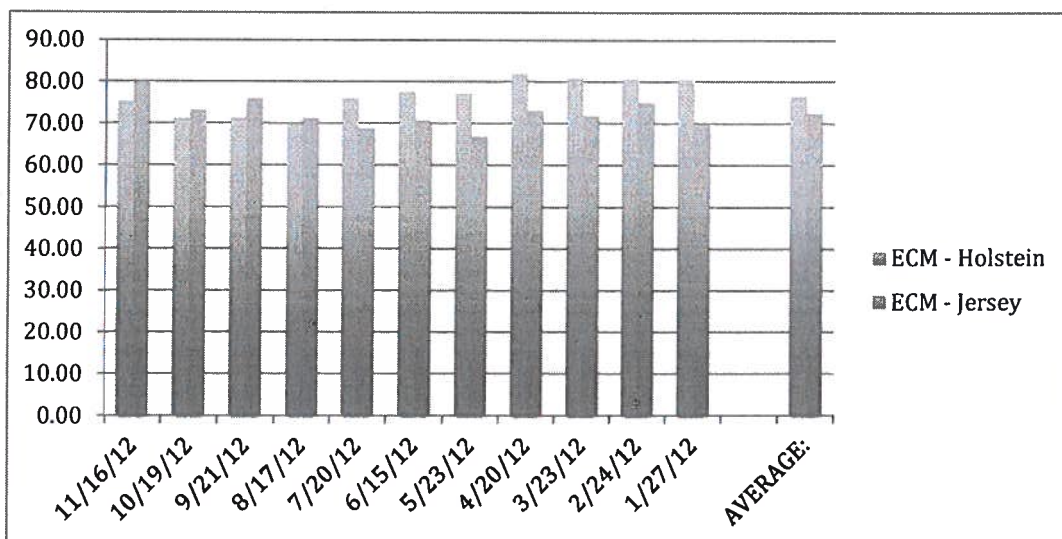


Figure 5: Comparison of Jersey & Holstein Energy Corrected Milk

Feed Efficiency

In a 30-day average Jersey's consume 45.17 lbs. of dry matter/day and Holsteins consume almost 10 lbs. more than that at 55.62 lbs./day.

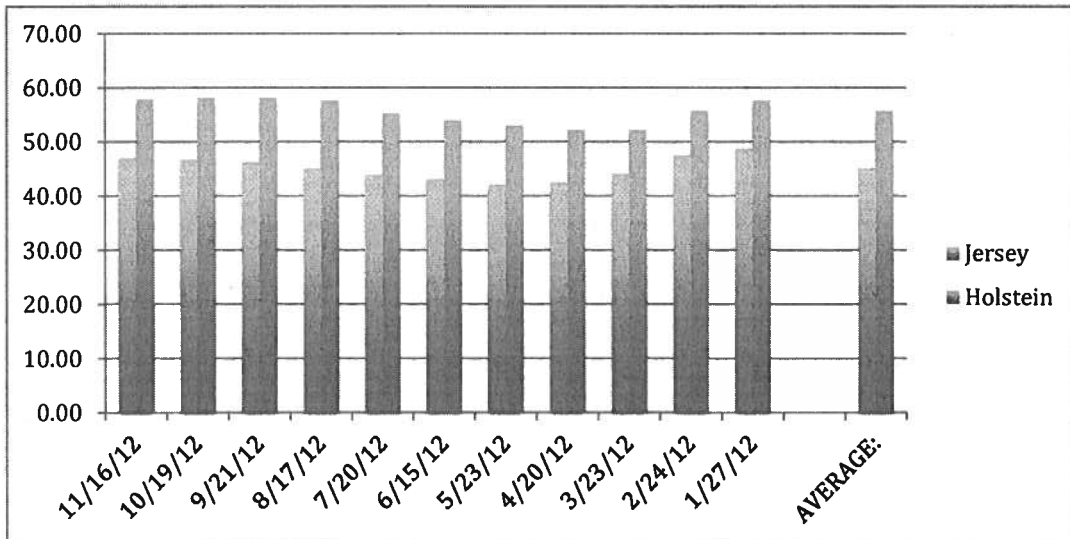


Figure 6: Comparison of Jersey & Holstein Dry Matter Intake

From this number, it is able to calculate the feed efficiency. By taking the amount of dry matter intake divided by the ECM the outcome will be the feed efficiency. The average feed efficiency for Jersey cows is 1.61 and for Holstein cows is 1.38.

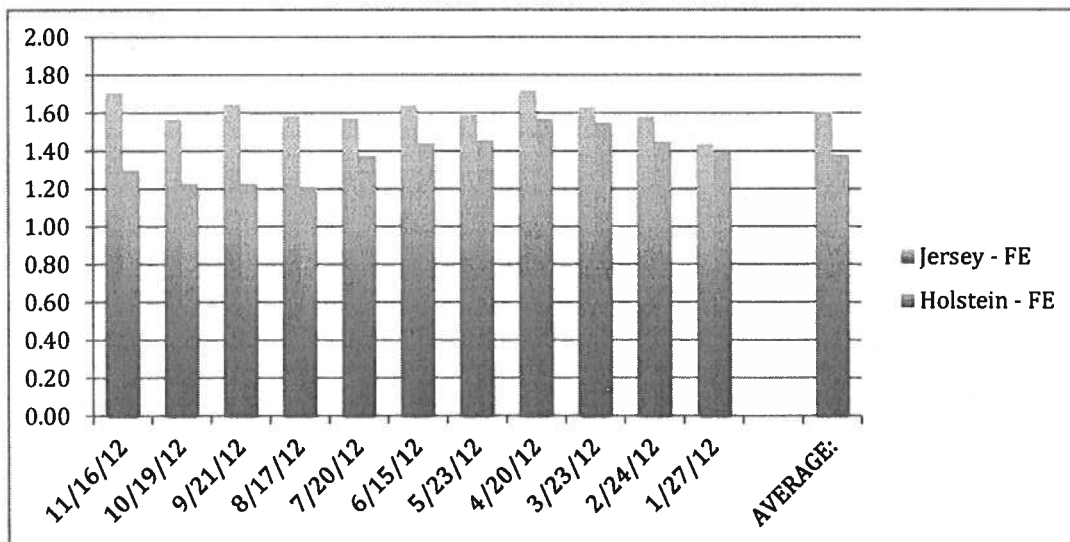


Figure 7: Comparison of Jersey & Holstein Feed Efficiency

Meaning that on average Jersey cows make 1.61 lbs. of milk for every 1 lbs. of dry matter they intake and for Holstein cows they make 1.38 lbs. of milk for every 1 lbs. of dry matter they intake.

RESULTS & DISCUSSION

The purpose of this study was to compare the economics of the Jersey and Holstein dairy cattle breeds in order to see which breed is more profitable on RTD. There are many things to consider when looking at the economics of a dairy. For this particular study we compared income over feed cost (IOFC), how much money it takes to get the cow into the barn (birth to calving date), and culling cost.

Some thing that also contributes to profitability is the price of the bull calves. Jersey bull calves are sold for only \$5 and Holstein bull calves sell for \$100 dollars more than that. This is the case due to the fact that Jersey bull calves do not grow into anything, and Holstein bull calves are usually sold for their meat. This is also the reason that the culling cost for the Jersey cow is less then the Holstein. Jersey cows just don't have the body mass that a Holstein cow does.

Total amount getting a calf into the barn

On RTD a Jersey heifer is able to calve at 22 months, about 671 days. On average, the cost per day for a Jersey heifer is \$1.25, totaling \$838.75 to get a single Jersey heifer into the milk barn. It takes a Holstein heifer 24 months, 732 days. On average, the cost per Holstein heifer per day is \$1.75, totaling \$1,281.00 to get a single Holstein heifer into the milk barn. That is \$442.25 more dollars for just one heifer.

Culling Cost:

RTD has a Jersey cull rate of 25%, and of those, which are culled, an average of 5% of those have died. Holstein's cull rate is 35%, with a 2.5% death rate. Comparing the two breeds straight across: with the average number of Jerseys being 801.09: 40 died and 160 were sold at \$600/cow. The total culling income is $\$96,130.91/200$ (total culled)= \$480.00 gains for each cow lost. Taking the cost of getting the cow to the barn $\$838.75 - \$480 = \$358.75$ net loss per cow culled. With an average of \$2807.90 Holstein cows, 70 died and 913 were sold at \$900/cow. The total culling income is $\$821,310.75/913$ (total culled)= \$835.71 gains for each cow lost. Taking the cost of getting the cow to the barn $\$1,281.00 - \$838.75 = \$358.75$ net loss per cow culled. That is an \$86.54 difference in favor of a Jersey heifer.

Income over feed cost (IOFC):

Milk income (milk price/ *ECM) – cost/cow/day (\$.15*DMI). By doing this calculation, the dairyman is able to see the head to head cost of each cow. On RTD Jersey cows on average are making \$.82 without the added premium. Holsteins bring in a higher initial income of \$13.04, however the cost per cow per day is a whole dollar higher than a Jersey cow at \$.831 and there is no added premium for a Holstein cow, bringing it's total IOFC to \$4.73. The Jersey cow pulls in a milk income of \$12.32, the cost per cow per day is \$7.31, the initial IOFC is \$5.54, with an average premium being added of \$.59, bringing the grand total to \$6.14: a total \$1.41 higher than the Holstein IOFC.

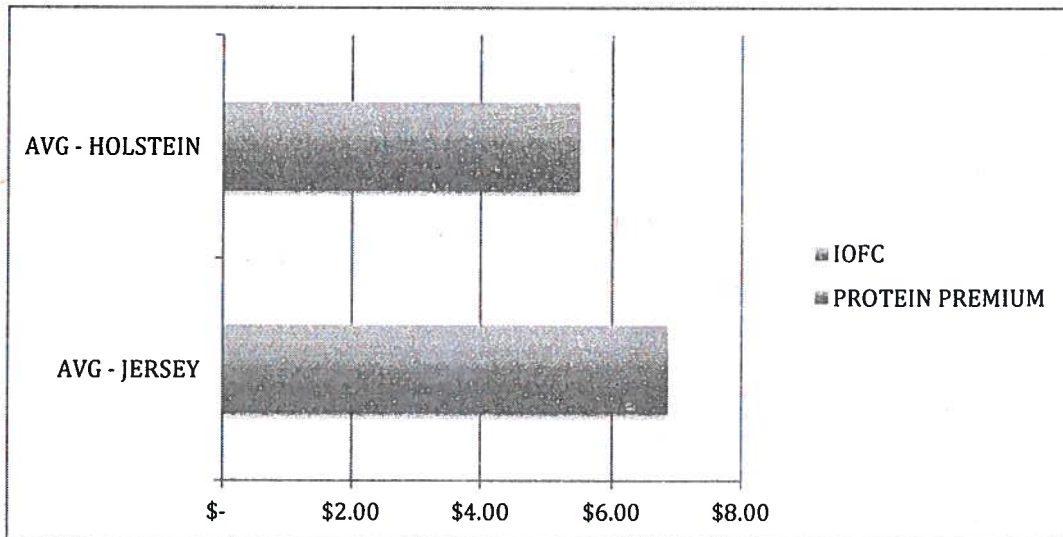


Figure 8: Comparing the IOFC with the added protein premium for Jersey milk

CONCLUSION

The importance of having an efficient and profitable herd cannot be stressed enough. Different aspects of RTD have been thoroughly examined and discussed. On RTD, Holstein cows on average produce 20 lbs. more milk and when on a level playing field have an average ECM of 76.55, 4.08 lbs. more than a Jersey cow. They also receive more money for when they are culled and sold as bull calves. However, on RTD Jersey cows have proven to be the more economically efficient breed in this study. Jersey cows provide more dense milk, which allows for them to receive more money per pound of milk, as well as having a higher pregnancy rate, IOFC, and FE.

When managing a progressive dairy it is important to realize the farms strengths and weaknesses. As seen in table 1, the total cost for a Holstein cow is almost two dollars higher then for that of a Jersey cow. In an average year the

Table 1: Comparison of Holstein and Jersey day-to-day cost.

Breed	Feed Cost	Replacement Cost	Operating Cost	Total
Holstein	10.89	\$0.58	\$6.00	\$17.47
Jersey	9.36	\$0.34	\$7.20	\$16.90