

**The Effect of Days in the Close Up Pen on 60 Day Cull Rates and
Milk Production in the Subsequent Lactation**

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ABSTRACT

The transition period is one of the most important times in a cow's life. Cows during this period are susceptible to many kinds of health problems that are related to the time of calving. These metabolic disorders can have a large impact on the beginning milk yields of dairy cows. This study was done to see if the amount of days in the close up pen has a large effect on milk yield after calving. Five Holstein dairy herds in the California Central Valley were used for this study. Residence time in close up pen was recorded for all cows. After the animals calved they were put into groups based on the amount of days that they were in the close up pen. For each group, week 4, week 8 and peak milk production were used to track the amount of milk yield for each group. This was done to examine if amount of days in the close up pen affected the cow's milk yield after calving. Also, the 60 day cull rates were evaluated to see how the amount of days in the close up pen affected the animals risk of being culled. Lastly gestation length for each group was examined to see if the animals were calving within the expected time frame.

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Introduction

The transition period has been defined as the 3 weeks before calving until 3 weeks after calving (Coonen et al., 2011). The transition period is very important, because it can determine a cow's performance in the next lactation. Correct management can be a very good way to increase milk yield and reproductive performance throughout the next lactation. Because there are so many factors that can affect the cow during this period, it is very important to manage transition cows correctly. Correct management of the transition period can limit the number of metabolic diseases in a herd. Diseases such as metritis, fatty liver, hypocalcaemia, and ketosis can all affect the production and reproduction on a dairy herd. A cow's production and reproduction is negatively impacted because of these diseases. There are many factors that play a role on the development of these diseases. Managing areas such as, daily dry matter intakes (DMI), body condition score (BCS), and grouping strategies can all have an impact on the animal at the time of calving. After the animal calves it will be in a state of negative energy balance. Energy balance is the difference between energy consumed and energy required for maintenance, growth, pregnancy, and milk production (Grummer et al., 2010). Knowing that there are so many factors that can affect a cow, can we manage the factors in order to limit the time the animal is in negative energy balance? Is there an optimal amount of days for a cow to be on a close up ration, where milk production can be maximized? These questions are very important for a manager to consider when looking at their management strategies for transition cows. Transition management is an area on

a dairy that can be easily over looked but, this period is the most important time in the animals life. Correct management can increase milk production and longevity when the transition period is properly managed.

LITERATURE REVIEW

The transition period is a very important time in a cow's life. The cow has to have a calf and then begin making milk at the same time. This creates a difficulty for the animal, leaving them in a state of negative energy balance and increased susceptibility to many diseases. These diseases may cause a loss of milk production early in a cow's lactation. This is a very crucial time for the animal and is a very important part of dairy management. Here are some of the most critical facing the transition cows.

Hypocalcaemia (Milk Fever)

Milk fever and subclinical hypocalcaemia (total blood Ca < 2.0 mmol/l) are the most important macro-mineral disorders that affect transition dairy cows. On average, 5-10% of dairy cows may be found to have clinical milk fever, (Mulligan et al., 2006). Cows with milk fever produced less milk than non-affected cows for the first 4-6 weeks of lactation (Rajala-Schultz et al., 1999). Milk fever is a metabolic disorder that occurs after calving that can have a great effect on the beginning of a cow's lactation.

Causes

Changes in calcium (Ca) metabolism induced by lactation are more significant than parturition *per se* to the pathogenesis of parturient paresis, as the loss of blood Ca to milk may exceed 50g per day (De Garis et al., 2008). The demand for Ca may only be satisfied by increasing absorption, from the rumen or intestines, and increasing mobilization from tissue, especially bone reserves of Ca, as circulating blood Ca is limited (De Garis et al., 2008).

Symptoms

According to the Merck Veterinary Manual, cows that suffer from milk fever will have a lower body temperature that can be first seen in the outer extremities like the ears. In the second stage of milk fever, the cow may seem to lack coordination when walking. This can eventually lead to the cow's inability to stand. If not treated properly, milk fever can also lead to the death of the animal (Merck, 2005).

Prevention

De Garis and Lean (2008) present data that from a recent meta-analysis, which indicates that the effect of DCAD on milk fever incidences is a linear one. This implies that reducing DCAD will decrease the risk of milk fever (Mulligan et al., 2008). Mineral nutritional management needed to effectively prevent milk fever requires both macro-mineral of the diet as well as to the DCAD. Manipulation of macro-mineral nutrition is needed to stimulate Ca homeostasis mechanism, and manipulation of the DCAD to induce a strong ion metabolic acidosis is needed to quickly stimulate Ca turnover (De Grais et al., 2008).

Fatty liver

Fatty liver is defined by as a metabolic disorder that is characterized by a high content of lipids and triglycerides (TG) in the liver (Ingvarsen, 2006). Gerloff et al., 1986 also stated that fatty liver is a multifactorial metabolic disorder that occurs around parturition and as a secondary disease of other production

diseases that depress appetite or increase the mobilization of body lipids
(Ingvarsten, 2006)

Causes of Fatty Liver

Fatty liver occurs during times of elevated non-esterified fatty acid (NEFA) concentrations in the blood. The elevation may be response to hormonal changes that accompany parturition (Grummer, 2008). If NEFA uptake by the liver becomes excessive, fatty liver may develop. (Ingvarsten, 2006). During the transition period, there is a decrease in the animals feed intake, Forcing the cow into a negative energy balance. When the cow is in a negative energy balance state, it will utilize body adipose tissue for energy. This causes a large increase in TG in the blood, which causes the liver function to slow. When the liver is not processing TG properly, the blood will increase in NEFA concentration.

Symptoms of Fatty Liver

The clinical symptoms of fatty are depression, a lack of appetite and weight loss, with cows seeming weak and apathetic (Ingvarsten, 2006). When an animal is under these types of conditions, it is important to realize milk production is being lost. When a cow is suffering from fatty liver, a decrease in DMI and weight loss will negatively affect milk production.

Prevention of Fatty Liver

One way to try to prevent fatty liver is diet formulation. Diet formulation to increase energy density is typically done to minimize the magnitude of negative energy balance and reduce fatty acid mobilization from adipose tissue (Grummer, 2008). This preventive strategy is trying to decrease the amount of fat

mobilization. Fat mobilization will slow the liver function causing an increase of NEFAs in the blood. One factor affecting fat mobilization may be high body condition score. High body condition score at the time of calving will increase the utilization of body adipose tissue. Preventing fatty liver, by managing body condition in late lactation and dry period will decrease fat mobilization and can decrease the amount of cases of fatty liver on a dairy herd.

Ketosis

Ketosis is a metabolic disorder characterized by relatively high concentrations of the ketone bodies acetoacetate, β -hydroxybutyrate and acetone and low to normal concentrations of glucose in the blood (Ingvarsen, 2006). Ketosis occurs if the amount of glucogenic substrate is limited. This is the case when cows are over conditioned at parturition, when feed quality is poor, and when cows have diminished appetite. Ketogenesis will be highly increased thus involving a risk of Ketosis (Ingvarsen, 2006).

Causes of Ketosis

Ketosis occurs early in lactation usually between about 10 days and 6 weeks postpartum. Ketosis occurs when the cows cannot get enough blood glucose. The animal attempts to restore energy by breaking down its fat stores. As a result, the ketotic cow has a high concentration of fatty acids in the liver and blood circulation. (Merck, 2005). Body condition at the time of calving may also be a factor that causes ketosis in cows. Body condition scores of 3.5 or more at calving increase a risk of ketosis considerably (Gillund et al., 2001)

Symptoms of Ketosis

In a study performed by Duffield in 2000, Cows that have ketosis have a higher concentrations of ketone bodies in the blood, urine, and milk (Goldhawk et al. 2009). This is caused by an increased loss of body weight post calving. Blood, urine, and milk tests are available and can be used to determine if a cow is suffering from ketosis. Cows with higher levels of ketone bodies will have lower feed intakes and milk production in early lactation. Cows that have lost body weight can have high levels of ketone bodies and should be tested for ketosis.

Prevention of Ketosis

A good way to prevent ketosis is to manage the body condition score during late lactation. If cows have a body condition score greater than 3.5, they are more likely to get ketosis. Preventing weight gain in later lactation should help decrease the instances of ketosis in a herd. Another way to prevent ketosis is to maintain DMI. At the time of calving, there is a decrease in DMI which forces the cow into a negative energy balance because of the milk yield at the same time. Negative energy balance may lead to metabolic diseases one of which is ketosis. Maintaining proper dry matter intakes will help shorten the time that the cow is in negative energy balance and hopefully prevent the animal from going into a ketotic state. When the animal is in a state of negative energy, balance both milk production and reproductive performance suffers later in lactation. Reproductive performance, particularly the probability of conception, may be negatively associated with the magnitude and duration of negative energy balance (Buckley et al., 2003). Ketosis is a disorder that is related to

negative energy balance so it can affect the reproduction on a herd, and is important to manage.

Metritis

In general metritis, refers to an inflammation of the uterus during the first 21 to 28 days after calving (Huzzey et al., 2007). Metritis is a disease that is common in transition cows because of the factors that come along with calving. Cows were 15.8 times more likely to develop severe metritis if they had an assisted calving. Calving difficultly increases trauma to the uterine wall and may increase susceptibility to disease by increasing risk of harmful bacteria entering the reproductive tract (Huzzey et al., 2007). There are many factors that can increase the risk of metritis on a dairy herd.

The first factor that can impact metritis is daily DMI. Days spent on the close up diet was highly correlated with the gestation length because both variables were influenced by predicted and actual calving dates. For both these variables, fewer days on the close-diet and/or shorter gestation length were associated with an increased risk of severe metritis (Huzzey et al., 2007). Dry matter intake is very important for close up cows, and can help reduce the risk of metritis on a dairy herd. Severely metritic cows consumed less feed than healthy cows beginning 2 weeks before calving and continued to consume less DM throughout the 4 weeks of the remaining study. Cows with mild metritis ate less DM compared with healthy animals during the week before calving and throughout the 3 weeks post calving period (Huzzey et al., 2007). Table 1 shows the affect that DMI has on the risk of metritis.

	Week -2	Week -1	Week +1	Week +2	Week +3
DMI					
Healthy	14.9	14.3	14.8	16.5	17.4
Mild Metritis	14.3	12.7	12.2	13.9	15.5
Severe Metritis	13.1	11.2	8.8	12.1	13.6

Table 1. The effect of prepartum DMI and the risk of metritis in dairy cows, adapted from Huzzey et al, 2007

Based on this study, cows with higher DMI are less likely to develop severe metritis. Controlling environmental factors such as heat stress and animal grouping are good ways to increase daily DMI and prevent metritis in a herd.

Another factor that can influence metritis is body condition score. Body condition score (BCS) during the transition period and subsequent effects on health, and reported increased rates of retained placenta (RP), ketosis, and milk fever in cows that had a BCS>3.25 compared with a BCS<3 at dry off (Huzzey et al., 2007). In this case, cows that enter the dry period with a BCS>3.25 have an increased rate of RP, which is a form or can lead to metritis. Interestingly, DMI has been shown to decrease linearly with increasing BCS during the pre-partum period (Huzzey, et al., 2007). This shows us that cows with a higher BCS are more likely to consume less DM as they go through the transition period. As previously stated, cows that have a lower DMI during the transition period are more likely to develop metritis. Managing cows BCS as they enter the transition period can help reduce change in BCS, and decrease the amount of metritis in the animals.

Milk production was lower in cows that identified with severe and mild metritis in the study during the first 3 weeks after calving (Huzzey et al., 2007). Mildly metritic and severely metritic cows produced on average 5.7 and 8.3 kg less milk per day during the first 3 weeks of lactation relative to healthy cows (Huzzey et al., 2007). The milk production loss may have been due to a decrease in DMI of cows that have metritis. Cows that have metritis eat less DM per day as previously discussed, this will affect the cows energy balance and decrease milk yield during the beginning of the lactation. Transition management practices should try to improve DMI, and decrease negative energy balance. This will help decrease instances of metritis in a herd and increase milk production starting in the early weeks of the lactation.

Body Condition Score Related to Health

The maintenance of an optimal body condition score relative to lactation stage, milk yield, nutrition, and health status, throughout the lactation cycle, is perhaps the most important aspect of dairy cow management that facilitates a healthy transition from pregnancy to lactation (Mulligan et al., 2006). Body condition is recorded on a 1-5 point scale that reflects the body weight of a cow, 1 being the least amount of body fat and 5 being the most. It has also been seen that cows that have a higher BCS are likely to decrease feed intake during the last 3 weeks of the transition period. This will cause the mobilization of adipose tissue at the time of calving, and increase the negative energy balance of the animal. This phenomenon of feed intake reduction together with the mobilization of adipose tissue and its accumulation in the liver has in some cases been

associated with fatty liver, difficult calving, retained placenta and displaced abomasum. Furthermore, it has been reported that dairy cattle with a BCS of 4 or greater in the dry period have an increased likelihood of developing of milk fever (Kim and Suh, 2003). Issues with BCS can be related to most of the metabolic disorder we see in transition cows today. All of the previously discussed diseases can be associated with BCS loss. Cows with high body condition have a greater risk of developing diseases. Improving BCS management during the late lactation of dairy cows can greatly improve the transition health in a dairy herd.

Body Condition and Milk Production

Many cows that undergo BCS change during the transition period tend to have less milk production at the beginning of the next lactation. This may be due to a decrease in DMI and a larger negative energy balance. When the animal is in a state of negative energy balance, DMI is low. Low DMI causes less nutrients be available for milk production. Also during a time of high body adipose tissue usage, the animal is more likely to develop a metabolic disorder that will decrease milk yield. Cows that have milk fever produced less milk than non-affected cows for the first 4-6 weeks of lactation (Rajaha-Schultz et al., 1999). Other diseases like fatty liver, ketosis, and metritis all decrease DMI and decrease milk production. Maintaining body condition score during the close up period can help reduce the likelihood of decreasing DMI at freshening. This will help decrease the amount of transition related diseases, and help increase milk yield throughout the beginning of next lactation.

Body Condition and Reproduction

Significant loss of body energy occurs in early lactation when levels of feed intake fail to meet the energy demands of the cow to support milk production (Beever, 2006). Large losses in body energy storages or BCS during early lactation to support milk production create a negative energy balance. Reproductive performance, particularly the probability of conception, may be negatively associated with the magnitude of and duration of energy balance in early lactation. It has been reported that cows losing between 0.5 and 1.0 BCS between calving and first service had a mean pregnancy rate to that service of 53% compared to 17% with cows losing over 1.0 BCS at this time (Beever, 2006). Because negative energy balance and BCS loss are associated with most of the transition disorders, most of the disorders will effectively decrease reproductive performance. Negative energy balance may be caused by a metabolic disease, decrease in DMI, or BCS loss all of which will negatively have an impact on reproduction on a dairy herd.

Factors that can Affect the Transition Period and DMI

One factor that can affect cows during the close up period is the amount of competition or overcrowding in the feed area. In the week before calving competitively fed multiparous cows spent 28% less time eating than noncompetitively fed multiparous cows, resulting in lower DMI per visit (Proudfoot et al., 2009). An increase of social stress can affect access to bunk space which may contribute to decreased DMI. Potential negative interactions put close-up transition animals at risk for negative energy balance during the critical period

immediately before calving (Coonen et al. 2001). This shows that competition and overcrowding at the feed bunk can decrease the amount of DMI that has negative effects on a cows performance post-partum.

Another factor that can have a negative effect is the act of regrouping. Regrouping is a practice that is normal on dairy herds. Putting animals into a new pen close to the time of calving is a common practice. It is done to make room for more animals who are approaching calving. Cows that were moved to a new pen after regrouping decreased DMI on d 0 compared with the baseline period before regrouping, whereas cows that remained in the home pen did not change DMI. Both treatments showed significantly decreased feeding rates on the day of regrouping relative to the baseline period, and this decrease persisted until d 2 for animals that remained in the home pen (Schirmann et al., 2011).

One strategy that was suggested by Norlund et al (2006) was an idea where all of the cows with similar calving dates are put into a pen, and no cows are added to that pen until all of the cows have calved. This strategy is known as an “all in all out”. This attempts to limit the stress of regrouping animals (Coonen et al., 2011). The attempts to limit the amount of stress that the animals are under can help the declining DMI. The main problem that people can run into with an “all in all out” system is the amount of facility space. On a large scale dairy herd, this system is hard to achieve because of the amount of space that is needed for this system. Overcrowding may happen in times of the year when the amount of cows calving is the greatest. This practice that should be avoided if possible during the transition period.

Thermal stress can cause an animal to decrease its DMI, which will also decrease milk yield and reproductive performance (West, 2003). This is very important for the management of transition cows. When you have a decrease in DMI during the transition period and post calving, the animals are more susceptible to getting disease. Shades in the pen and over the feeding area will help decrease the levels of heat stress that the animals are under. Also, fans and misters are recommended over the feed area. This is a very good way to keep the animals cool. This will help maintain the DMI of the transition animals. Management practices that help avoid heat stress by utilizing proper cooling systems are a great way to maintain DMI and improve the transition health of a dairy herd.

Expected Results

This experiment was done to find if there is an optimal amount of days for a transition animal to be in the close up pen. It is expected to see less milk yield for the cows that enter the close up pen and then only spend a short amount of time in there. Because of the decrease in DMI after moving an animal these animals will be at a greater risk for negative energy balance. I also hope to see that, if a cow is in the pen for a long period of time, there will also be a negative effect. This might be displayed as an increase in culling rates or a decrease in milk yield.

Materials and Methods

1. Experiment

Holstein cows from five different herds in central California were evaluated. The cows were split up into two different groups. The first group of cows were, cows that were in the first lactation. The second group,, was second lactation and greater cows. The dairies were using Dairy Comp 305™ to track and record time spent in the close up pen, week 4 milk, week 8 milk, and peak milk. The experiment was done to see if there is an optimal time for a cow to spend on a close up ration, and to see if time spent on that ration affected the sixty day cull rate of the herds.

Days in close ups (DINCUC) is an item on Dairy Comp 305™ that is used to track the amount of days that an animal is in the close up pen. Animals in each group were then grouped based on the amount of days spent in the close up pen prior to freshening. The groups that they could have gone into were as follows, 1-7, 8-14, 15-21, 22-28, and 28+. The amount of days was then compared to week 4, week 8 and average peak milk for the each of the groups. The command that was used was `SUM W4MK W8MK PEAKM FOR LACT=1 DINCUC=1-100\B`. This command will give you an average of all the lactation one cows that were given the item DINCUC, and the average week 4, week 8 and peak milk. This command will can also be used for the cows in lactation greater than 1. The values were then evaluated later to see if there was a difference in milk yields based on DINCUC.

After freshening the 60 day cull rate for each group was evaluated. This was done by using the events table on Dairy Comp 305™. The number of animals that were sold and died in the first 60 days in milk were added together and then divided by the amount of animals fresh. The animals stayed in their lactation groups and were also divided based on the days that they spent in the close up pen. This was done to see if there is an amount of time that negatively affects the animals. Higher levels of culling in the first 60 days in milk based on days spent in the close up pen were later evaluated.

Gestation length was determined for each group using Dairy Comp 305™ “DCC” item. This was done to see if the animals were calving due to a stressor such as twins, or if the calvings were natural. The command in Dairy Comp 305™ was SUM PDCC FOR LACT=1 DINCUP 1-100\B. The command was used for first lactation and second lactation and greater animals. The data was entered into Microsoft Excel and a table was created and put into the results section.

All of the data that was collected in Dairy Comp 305™, was transferred to Microsoft Excel™. In Excel™, the data from all the of the herds were converted into a percentage of animals in that herd. This was done so that all the herds could be discussed as a percentage and compared to one another. The data that was collected was divided by the average to get a percentage. For example, week 4 milk for lactation one DINCUP 1-7, was divided by the average week 4 milk for lactation one. This was done to see what the percent of milk yield for that group of cows was. This process was continued for week 8 milk, peak milk, and cull rates.

Results and Discussion

Days in close up related to milk production

First lactation cows for 5 dairy herds were broken into different groups based on the amount of time that they spent in the close up pen previous to calving. Figure 1 shows the affect that the days in the close up pen has on the percentage of week 4 milk yield production.

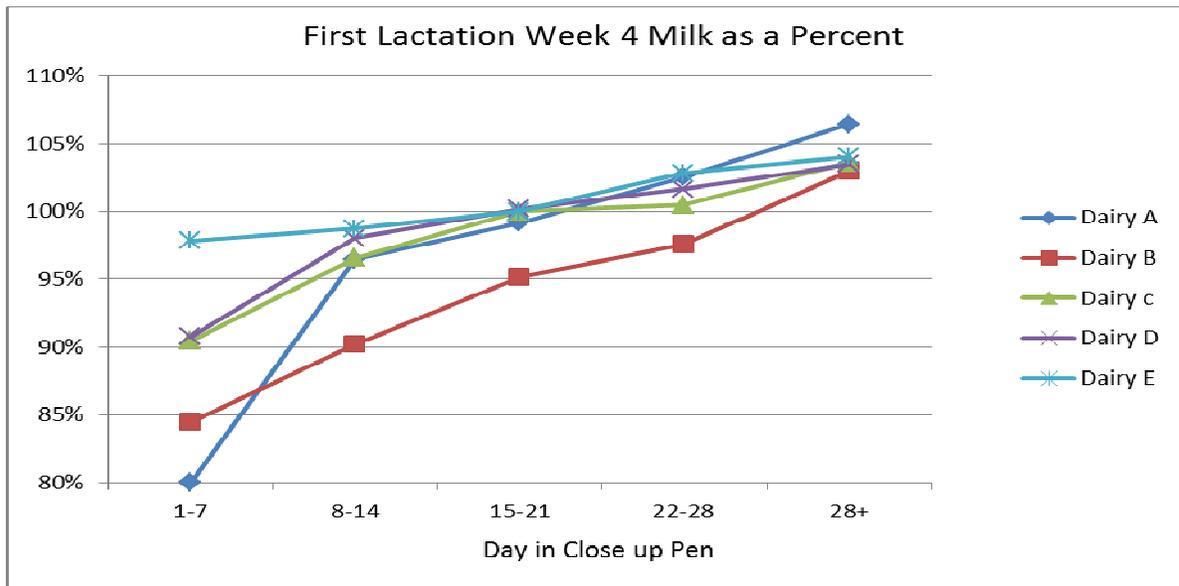


Figure 1. First lactation milk production as a percentage of week four milk for each dairy herd. The week four milk production is a percent of average week four milk for first lactation animals in each herd.

In this figure, we can see that as the days in the close up pen increase so does the week four milk production. As seen above when the first lactation animals are only in the close up pen for 1 to 7 days they reach a maximum of 97 percent and a minimum of 80 percent in this group of first lactation animals. This is a good indicator that as the time in the close up pen increases so does the week four milk production.

In figure 2 we see the week 4 milk production as a percent of the herd average week 4 production for animals lactation greater than one. The difference in this figure is the age of the animals, which seems to have an effect on the animals that are in the close up pen for a longer amount of days.

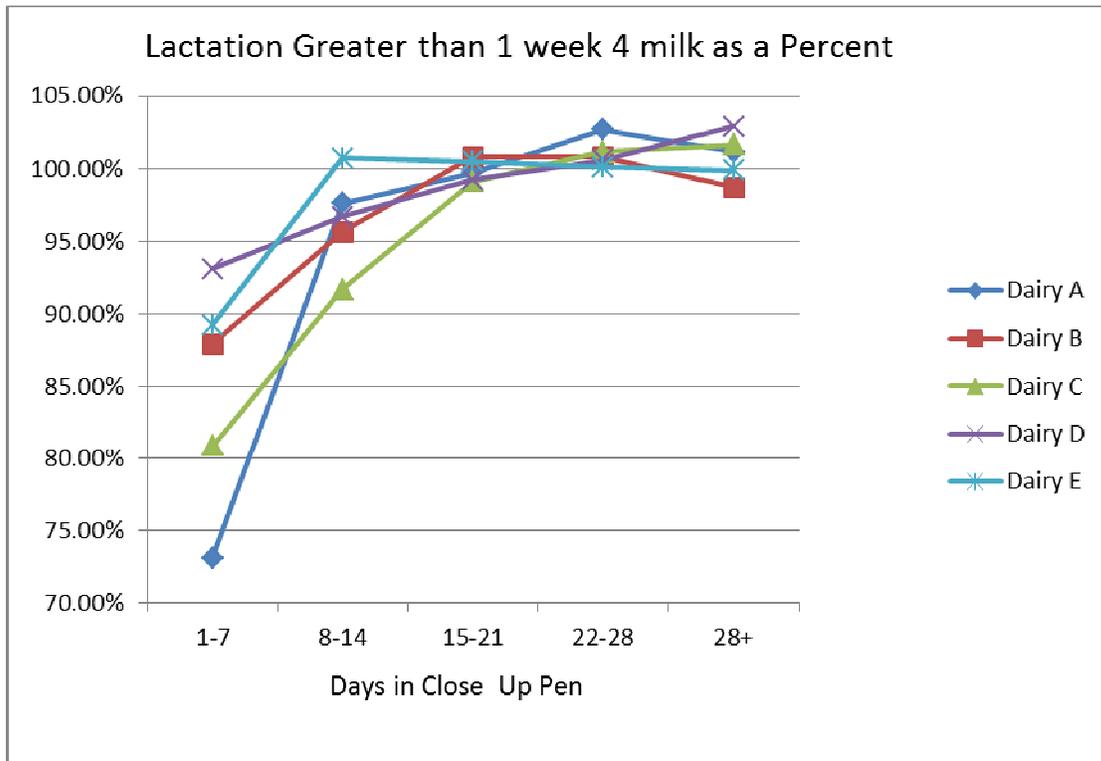


Figure 2. Greater than first lactation milk production as a percentage of week 4 milk production for each dairy herd. The week four milk production is a percent of average week four milk for animals greater than first lactation animals in each herd.

In this figure cows that are in the close up pen for 1-7 days only give 73-93% of herd average week 4 milk production. As days in close up pen increase so does, the percent of week 4 milk production, regardless of herd. The difference between the first lactation cows and cows greater than first lactation is the decline in milk production after 22-28 days in the close up pen. This difference may be due to the increase in body condition score in the cows greater than first

lactation. First lactation cows are still growing at this time, whereas the second lactation and greater cows are gaining body condition score not body growth. Increased losses of body condition score can lead to an increase in negative energy balance and a decrease in milk production during the earlier stages of lactation. For both sets of animals in these herds it seems that an appropriate amount of days in the close up pen is between 14 and 28 days. The lowest herd at 14 days in close up pen is about 90 percent of week 4 milk production, and after 28 days there is a trend in declining milk production. Aiming for the 14-28 days in close up pen the best management practice.

Figure 3 shows the effect of days in close up pen for first lactation cows on week 8 milk as a percent of the first lactation average week 8 milk.



Figure 3. First lactation milk production as a percentage of week 8 milk production for each dairy herd. The week eight milk production is a percent of average week eight milk for first lactation animals in each herd.

In this figure we see that first lactation cows that are in the close up pen for 1-7 days are still not reaching full milk production potential. The animals are anywhere from 85 percent to 97 percent of average week 8 production. As days in close up pen increase, so does the percent of week 8 milk yield. This shows that week 8 milk production will increase as the days in close up pen increases. This graph also shows, that in these herds, around 21 days in the close up pen will help to achieve the average week 8 milk.

Figure 4 shows, the percent of herd average week 8 milk for cows greater than first lactation. The week 8 milk for this graph has a trend that seem to increase as days in close up goes up, but after 28 days in the close up pen it seems that week 8 milk begins to go down or flatten.

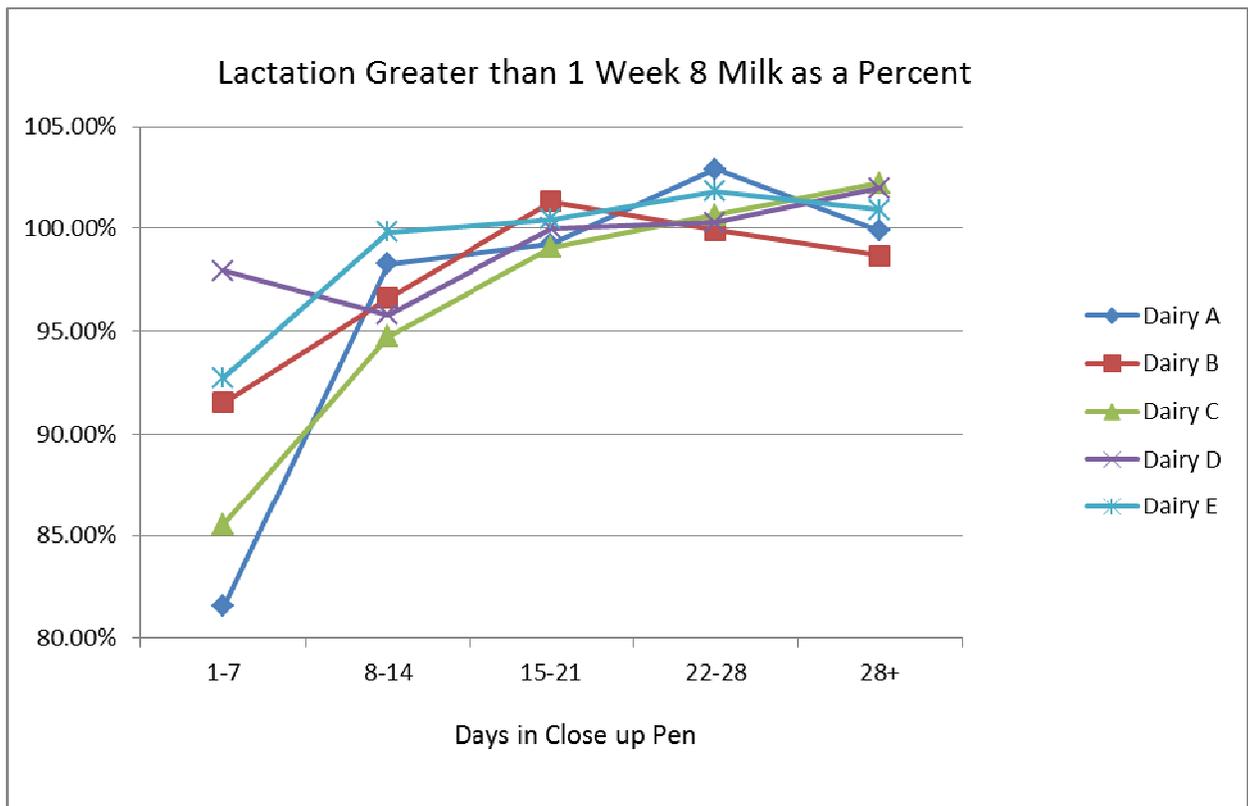


Figure 4. Lactation great than one milk production as a percentage of week eight milk production for each dairy herd.

In the graph above we see a similar result for week 8 milk as we saw in week 4 milk. Animals that are in the close up pen for 1-7 days only get to about 82 percent to 93 percent of average week 8 milk yield. The abnormal result for dairy D may be due to a small number of animals in that group. For this group of animals it appears that the best range is between 14-28, where these herds are averaging between 95 and 103 percent of week 8 milk. There is also no declining milk yield in this range of time in the close up pen.

Figure 5 shows the average peak milk as a percent compared to the average peak milk for first lactation cows in each herd.

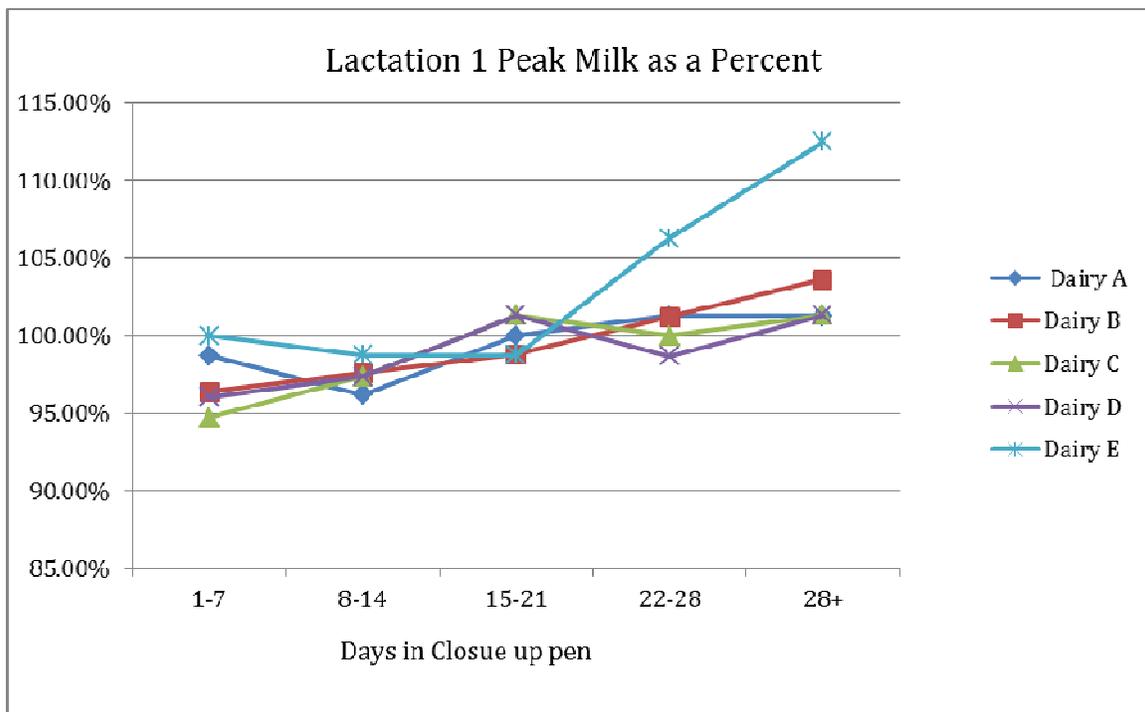


Figure 5. First lactation milk production as a percent of peak milk production for each dairy herd. The peak milk production is a percent of average peak milk for first lactation animals in each herd

This graph shows that as days in close up pen increase so does the percent of average peak milk. First lactation animals that are in the close up pen for 1-7 days are at a minimum of 95 percent of average peak milk. This shows that the animals are closer to reaching the potential peak compared to the groups that were struggling at week 4 and week 8 milk production. This may be due to the amount of time after calving. These animals are in better energy balance and producing closer to 100 percent of average peak milk. There is still an increase in percent of average peak milk as the days in close up increase but the animals are closer to the average peak. This shows that animals that have fewer days in the close up pen are more affected in week 4 and week 8 milk production. The peak milk production is still affected but the effect of days in the close up pen is not as great on average peak milk.

Figure 6 shows the percent of average peak milk production for cows greater than first lactation. This group of animals shows the effect that the days in the close up pen has on the animals compared to the herds average peak milk.

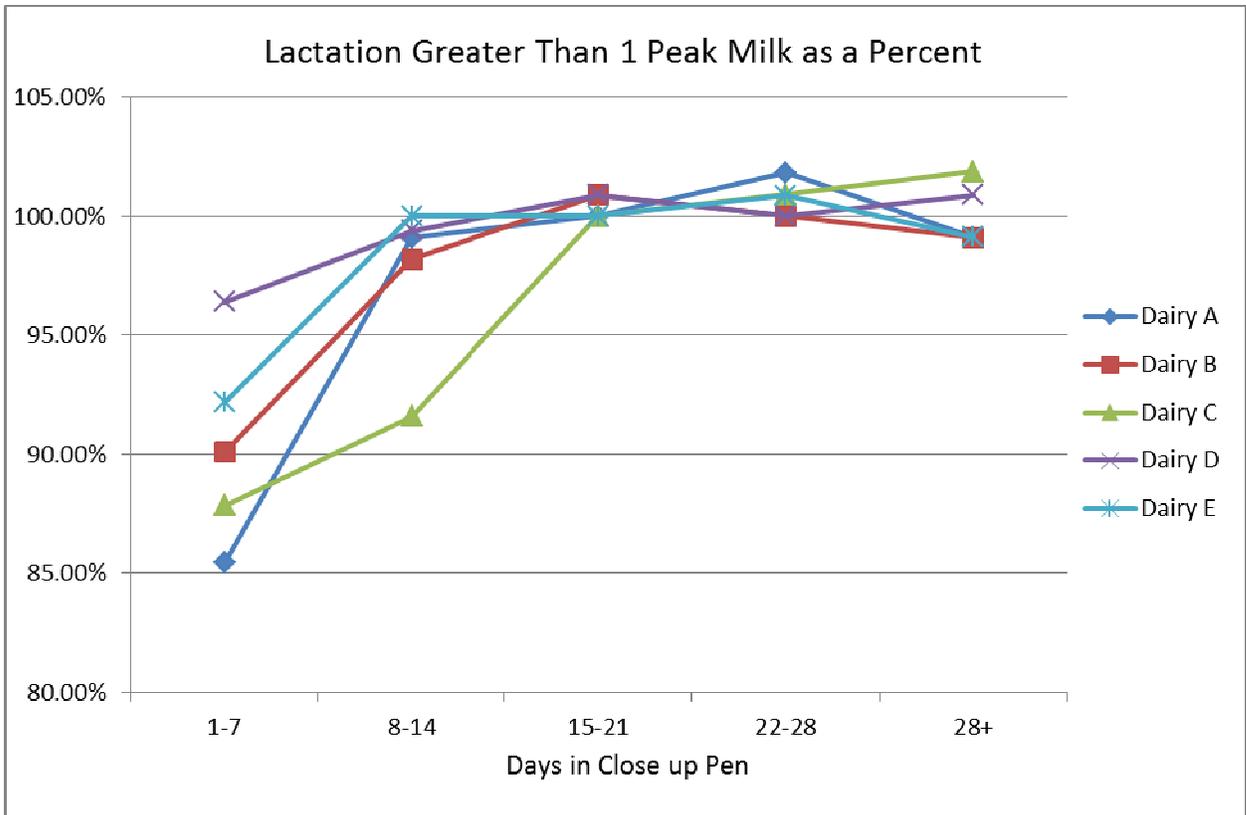


Figure 6. Lactation great than one milk production as a percentage of peak milk production for each dairy herd. The peak milk production is a percent of average peak milk for animals greater than first lactation animals in each herd

This figure shows that second lactation and greater cows days in the close up pen has a larger effect on peak milk production. Cows that are in the close up pen for days 1-7 reach between 86 and 97 percent of the average peak milk yield. This is less than first lactation animals who reach about 95 to 100 percent of average peak milk yield. Thus, shorter amount of days in close up pen has a larger impact in older cows on peak milk yield. According to this figure an appropriate amount of time for these animals to be in the close up pen is about 14-28 days. All herds excluding herd C reached 98 to 102 percent of average

peak milk in the 14-28 day range. Herd C may have had fewer cows in the selected group which may have affected the average for this test.

Days in the Close Up Pen and 60 days Cull Rates

Figure 7 shows the first lactation 60 day cull rates for each herd by the amount of days in the close up pen. Animals that were sold for dairy were taken out of the equation so they do not affect the cull rates.

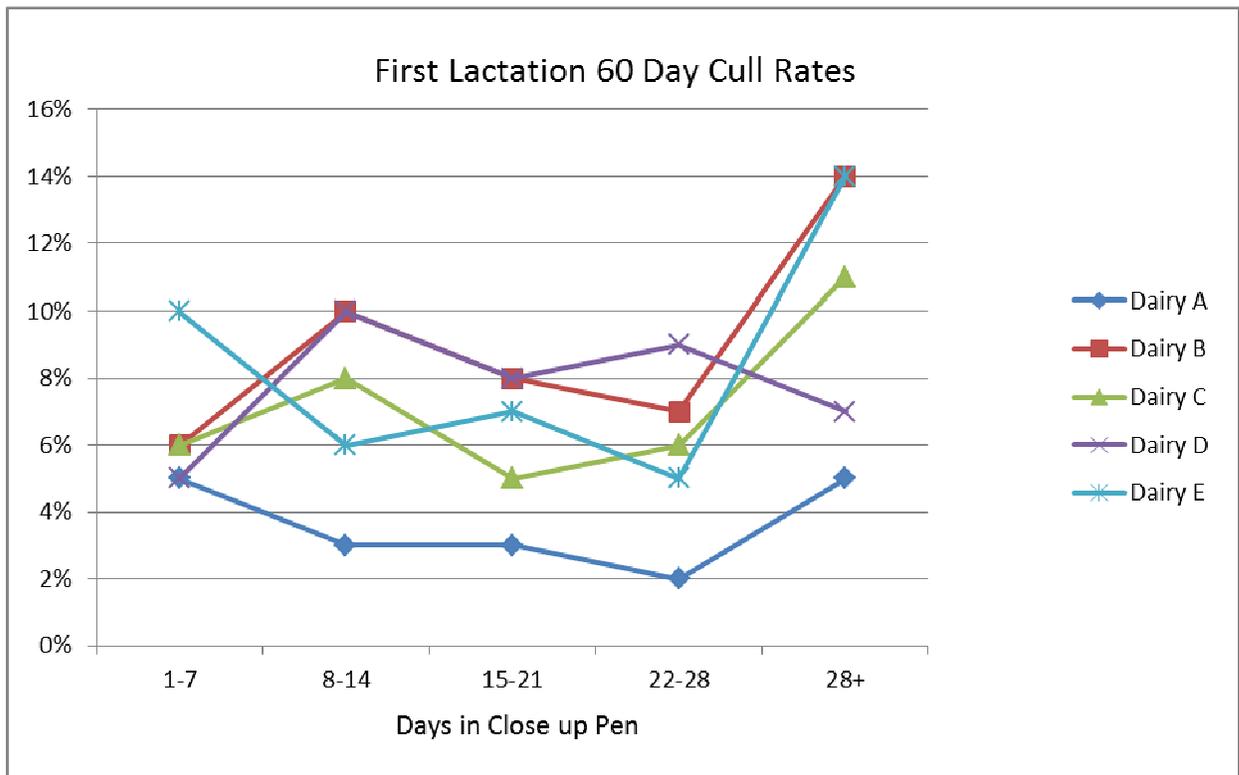


Figure 7. Sixty day cull rates for first lactation cows in each dairy herd.

This figure shows the effect that management can have on cull rates. Most of the herds have a different effect from one amount of days to the other. Many herds have different culling protocols related to milk production, reproductive performance, and health issues. This figure shows that the amount of days in the

close up pen may not affect the 60 day cull rates for first lactation animals. The only area that may be affected is the range that is greater than 28 days. In four out of the five herds the cull rates did increase in animals that were in the close up pen for greater than 28 days. This may be due to the increase of body condition score gain, and the metabolic problems that accompany it at the time of calving. This can cause the animal to struggle in milk production and reproduction early in the lactation and be a candidate for culling.

Figure 8 shows the 60 day cull rates for cows greater than first lactation for each dairy herd. The cull rates have been adjusted so that cows sold for dairy do not affect the cull rates.

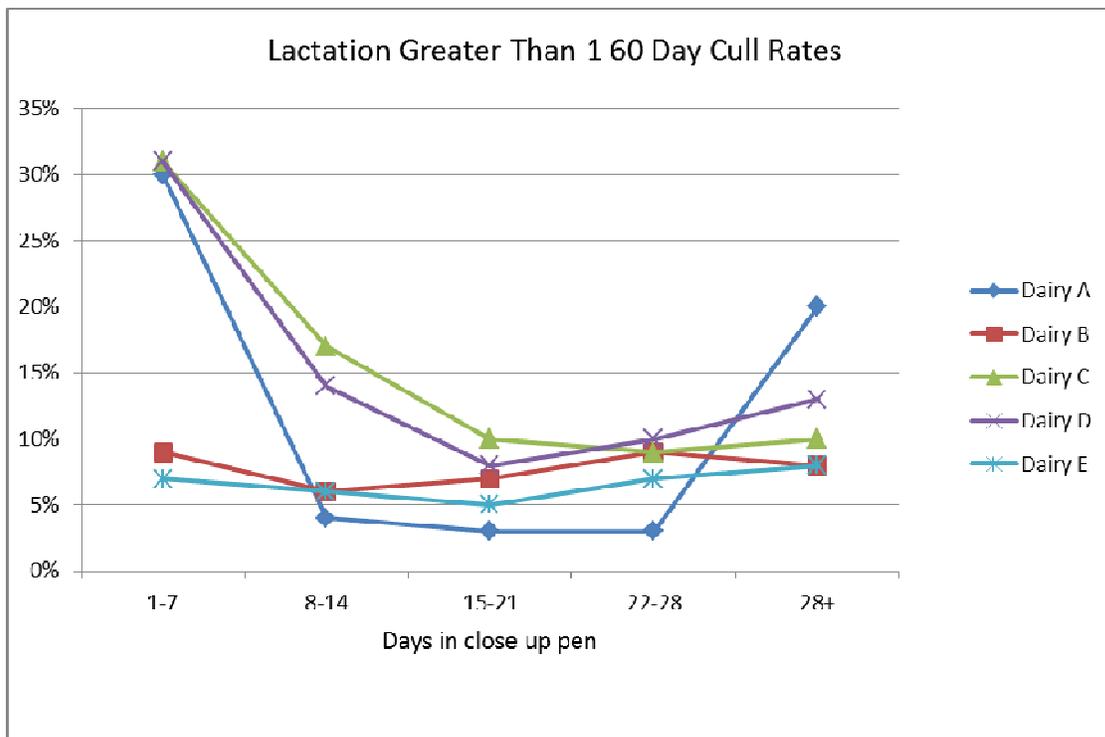


Figure 8. This shows that figure shows the 60 day rate for each dairy herd for animals lactation greater than 1.

In three of the five dairy herds, cull rates are highest when the animal is only in the close up pen for 1-7 days. As days in the close up pen increases, the cull rates have a tendency to decrease. When the animals are in the close up pen for 15-28 days, the 60 day cull rates for each herd are at the lowest. In four of the five herds the cull rates tend to increase for the animals that are in the close up for more than 28 days.

Days in Close up and Gestation Length

Previous days carried calf was used to see if the animals were calving after an appropriate gestation length. This was done to see if the animals that were calving early were a factor of the management or if it was caused by another outside factor. Tables 2 and 3 show the average gestation length for each herd and different lactation groups.

Previous Days Carried Calf for First Lactation Cows					
	Dairy A	Dairy B	Dairy C	Dairy D	Dairy E
Average DCC	278	278	275	276	276
DINCU					
1-7	261	268	260	264	265
8-14	273	272	269	270	271
15-21	275	277	273	275	276
22-28	280	281	277	280	281
28-100	286	282	285	282	284
Table 2. Previous days carried calf for first lactation animals for each dairy herd.					

The tables above show average previous days carried calf for each group of animals by the amount of days that they spent in the close up pen.

Previous Days Carried Calf for Cows greater than first lactation					
	Dairy A	Dairy B	Dairy C	Dairy D	Dairy E
Average DDC	277	278	277	278	279
DINCU					
1-7	261	264	262	262	265
8-14	270	272	268	271	270
15-21	275	277	273	275	277
22-28	281	281	278	280	282
28-100	285	285	283	285	286

Table 3. Previous days carried calf for animals greater than first lactation for each dairy herd.

When the animals in these herds are only in the close up pen for 1-7 days, it appears that this could have been due to a wrong date entered when the animal was confirmed pregnant. Alternatively, the gestation could actually be shortened, perhaps due to twinning. When the animals are in the close up pen for 8 to 21 days, it appears that animals are still calving 7 to 10 days early. When looking at DCC it appears that the animals that are in the close up pen for 22-28 days calve closest to 283 days. Outside factors appear to cause the animals to be in the close up pen for 1- 14 days. Because the animals are not calving close to the project date of calving, outside factors such as management error, twins, and other environmental factors are causing animals to have shorter days in the close up pen.

Milk production is affected by the days in close up pen. The factors that can cause the animals to be in the close up pen for shorter amount of time have a negative effect on milk production. When the animals calve early, it can cause problems in the next lactation. When animals are entered incorrectly in the

computer, have twins, or affected by the environment, these factors can cause calving before the project date of calving. This will limit the amount of time they are in the close up pen prior to calving. As said earlier the best amount of days for future milk production is about 14-28 day in the close up pen.

CONCLUSION

Days in the close up pen has an effect on milk yield during the next lactation. First lactation animals seem to be affected more during the week 4 and week 8 milk productions, when the days in close up pen are less than 14 days. Average peak milk in first lactation cows is not as affected by the days in close up pen. The animals seem to reach a minimum of 95 percent of peak milk even if they are only in the close up pen for less than 14 day. Sixty day cull rates did change as the amount of days in the close up pen changed. The change in cull rates were different between herds, presumably because management strategies in culling are different among herds. A proper management strategy for first lactation animals is to aim for 21 to 28 days in the close up pen. This amount of time in the close up pen has the most positive effect on milk yield.

Days in the close up pen seems to have a similar effect on cows lactation greater than one. Week 4 and week 8 milk production is lost when the animals are in the close up pen for less than 14 days. These animals range for 73 to 94 percent of average week 4 milk, and about 82 to 93 percent of average week 8 milk production with one herd as an outlier at 100 percent of average week 8 production. A difference between these animals and first lactation animals is the effect at peak milk production. Cows in a lactation greater than one are still affected at the time of peak milk if the days in the close up pen are 1-7 days. These cows only reach 86 to 95 percent of average peak milk which is different from the first lactation cows who produce a minimum of 95 percent of average peak milk. Another difference is the decline in milk production that can be seen at

all areas of milk production after 28 days in the close up pen. Cull rates for animals second lactation and greater are also different than those of the first lactation animals. The cull rates are similar for these herds. Most of the herds have higher cull rates for the animals were in the close up pen for 1-7 day, then the cull rates decrease. When the animals are in the close up pen for 28 days or more there is a tendency for the cull rates to go up. A good management strategy for animals greater than first lactation is to aim for 21 to 28 days in the close up pen. At this amount of days the cows seem to be at about 100 percent of milk production at week 4, week 8, and peak milk production.

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