2021

Winter Growth Rate and Timing of Marketing on Economics of Yearling Systems

Michael Merical

M. E. Drewnoski

Jay Parsons

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Mary Drewnoski
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Summary with Implications

Economic analyses were conducted examining 18 years of Nebraska monthly-average auction data to find the effects of certain management decisions on the profitability of yearling production systems. A 2×2 experimental design was used to examine four possible scenarios. The variables were either fast winter growth (daily gain, 2.0 lb/day) or slow winter growth (daily gain, 0.8 lb/day), and either a September or a July marketing date. In addition to profitability, risk management was also examined in this study. Average profitability of all scenarios was good, ranging from $112 to $143 per calf. Utilizing fast winter growth combined with marketing steers in September was the most profitable scenario.

Introduction

Discussions regarding optimum target rates of gain during winter and the window for selling calves, specifically selling yearlings in July vs. September are common among yearling producers in Nebraska. There are many ways to grow yearlings and every operation is unique in the resources that it has available, thus it is impossible to determine what system is best for all operations. However, it is possible to evaluate the potential impact of the decisions using example scenarios. The economic effects of using different target rates of gain while grazing corn residue in the winter in combination with marketing calves off of grass in July or September have been previously evaluated by using performance data from 3 previous studies and the average market price from 2017 and 2018 (*2020 Nebraska Beef Cattle Report*, pp. 31–34). Their analysis did not show a clear benefit to July vs. September marketing. However, given the limited scope of market data evaluated, the goal of this paper was to further explore these questions using long term historical market data.

Procedure

To evaluate the effects of growth rate in the winter and time of marketing of yearling steers on net profit in Nebraska, the following assumptions were made using animal performance from the *1996 Nebraska Beef Cattle Report*, pp. 51–53. A 506-pound steer was purchased (or retained) in October and then processed and fed a growing ration for 14 days (527 lb end BW). Calves were then wintered by grazing corn residue for 127 days with two amounts of distillers being fed based on data from *2017 Nebraska Beef Cattle Report*, pp. 34–35. For the fast rate of winter gain (FAST) calves were supplemented with 7 lb/d of dry distillers grain and average daily gain (ADG) was assumed to be 2.03 lb/d. For the slow winter gain (SLOW), 1.3 lb/d of dry distillers was supplemented and ADG was assumed to be 0.79 lb/d. A decision point then occurs whether to sell the cattle in February or hold them over for spring (91 days) and summer growing periods. Two choices were evaluated for the summer grazing period, a short 62-day period with marketing occurring in July or a long 120-day period with marketing in September. Calves with lower rates of gain in the winter will compensate in the summer resulting in greater gains on the same forage base than those with high rates of gain in the winter. The growth rate of cattle in the Sandhills of Nebraska decline in the late summer due to reduced forage quality. Thus, gains in early summer will be greater than in late summer. Therefore, in the fast winter growth scenarios, spring ADG was assumed to be 1.5 lb/day with summer growth assumed to be 1.44 lb/d for steers being marketed in July or 1.29 lb/d for steers being marketed in September. For the slow winter growth scenarios, spring ADG was also 1.5 lb/d with summer growth at 2.45 lb/d for steers marketed in July or 2.01 lb/d for those marketed in September (*1996 Nebraska Beef Cattle Report*, pp. 51–53).

Cost assumptions for all scenarios are outlined in Table 1. A 1% death loss was factored into the total wintering cost, as well as a 5.6% interest rate for 0.35 years on the purchase price of the calf. For the winter growing period, cattle were assumed to be grazing on corn residue priced at $0.56/day for both groups plus cost of supplement with either 7 lbs or 1.3 lbs of distillers grains per day (as-fed) priced using an average of the weekly prices from October to February each year from the USDA. For the spring growing period, feed prices were determined based on distillers grains and hay price data for each year from the USDA. A ration of 13 lbs of hay and 2 lbs of distillers grains per day (as-fed) was used to calculate the final spring feed price for all scenarios. Despite the steers on the slow winter system being lighter weight when grazing in the summer their intake as a percent of BW would be greater thus intake would be similar (*2000 Nebraska Beef Cattle Report*, pp 30–31; *2001 Nebraska Beef Cattle Report*, pp 34–36). The cost of summer grass was charged at the same price across scenarios based on historic pasture rental rates in the 2017–2018 Nebraska Farm Real-Estate Market Highlights from the Department of Agricultural Economics at the University of Nebraska-Lincoln. It was assumed that no protein or energy supplement was provided in the summer. The initial value of the calves in October of each year, and value when selling the following July and September of the succeeding year, were determined using LMIC Weekly & Monthly Combined Nebraska Auction Cattle Prices from 1999 through 2017, updated 9/3/2019 (Livestock Marketing Center, Lakewood, Colorado). The total cost of producing the steer (including the initial purchase price) was then subtracted from the sale value of the steer to calculate the net profit.

Table 1. Estimated cost ($/steer)[1] for growing steers with two different rates of winter gain (2.0 or 0.8 lb/d, fast and slow, respectively) and three different marketing times February (end of winter) July, or September over an 18 year period from 1999 through 2017.

	Fast	Slow
Processing	$15	$15
Interest on Animal	$8.79–$29.26 ($14.07)	$8.79–$29.26 ($14.07)
Death Loss (1%)	$4.49–$14.93 ($7.18)	$4.49–$14.93 ($7.18)
Receiving	$26.25	$26.25
Corn Residue	$71.12	$71.12
Distillers	$31.34–$125.37 ($61.04)	$5.82–$23.28 ($11.34)
Mineral	$6.35	$6.35
Feed Interest	$1.47–$2.39 ($1.76)	$1.22–$1.39 ($1.27)
Wintering Cost	**$170–$271 ($203)**	**$142–$176 ($153)**

	Market in July	Market in September	Market in July	Market in September
Spring Feed	$42.97–$150.71 ($66.06)	$42.97–$150.71 ($66.06)	$42.97–$150.71 ($66.06)	$42.97–$150.71 ($66.06)
Spring Yardage	$22.75	$22.75	$22.75	$22.75
Summer Grass	$23.02–$66.62 ($38.22)	$44.56–$128.95 ($73.97)	$23.02–$66.62 ($38.22)	$44.56–$128.95 ($73.97)
Interest on Feed	$0.60–$1.40 ($0.80)	$0.96–$1.92 ($1.31)	$0.60–$1.40 ($0.80)	$0.96–$1.92 ($1.31)
Interest on Animal	$14.65–$40.48 ($22.71)	$20.23–$55.90 ($31.36)	$12.74–$36.17 ($19.91)	$17.60–$49.95 ($27.49)
Spring/Summer Cost	**$116–$241 ($151)**	**$145–$289 ($195)**	**$113–$236 ($147)**	**$142–$284 ($192)**
Total Cost	**$292–$512 ($353)**	**$323–$560 ($398)**	**$257–$405 ($300)**	**$285–$452 ($344)**

[1]Costs are displayed as ranges between minimum and maximum values across years followed by the average in parentheses.

Table 2. Overview of the profitability ($/steer) of growing steers with two different rates of winter gain (2.0 or 0.8 lb/d, fast and slow, respectively) and three different marketing times, February, July, or September over an 18 year period from 1999 through 2017.

	Years Profitable	Average Net Profit	Maximum Net Profit	Minimum Net Profit
February Fast	10	$45.02	$211.53	-$80.57
February Slow	6	-$24.10	$126.63	-$195.43
July Fast	16	$123.03	$691.07	-$196.40
July Slow	16	$128.30	$634.67	-$211.06
September Fast	15	$142.83	$790.06	-$276.56
September Slow	13	$112.62	$719.93	-$312.26

The use of livestock risk protection and cattle futures contracts were also analyzed as a tool to mitigate risk for the September marketing date scenario. Data on Livestock Risk Protection (LRP) insurance was available for years after and including 2015, resulting in 3 years of usable data. Livestock Risk Protection was examined as a tool to mitigate risk at the highest level of protection offered in the data set. These coverage rates ranged from 97.63% to 99.18%. These data was gathered using the USDA's LRP Coverage Price, Rates and Actual Ending Values data set updated on 3/26/20 (United States Department of Agriculture, Washington, D.C.).

Results

An overview of the final net profit of the two winter growth rate scenarios with marketing in February, July, or September is shown in Table 2. The main driver in system profitability appeared to be the cattle market. Selling in February was determined to not be an effective marketing strategy as it was profitable much less frequently than selling in July or September. For both July and September, regardless of winter growth rate, the majority of years were profitable. The maximum profitability for these scenarios happened in the same year (2014) and the greatest losses occurred in the same year (2016). When evaluating the mean net profit, the fast winter growth combined with marketing in September appears to standout, netting on average $14.53/steer more than the next best scenario (July SLOW). However, the September FAST also had more risk as demonstrated by the spread from maximum to minimum profitability across years in comparison to July SLOW.

In order to visualize the relative variability in net profitability when using the two winter growth rates coupled with either July or September marketing, histograms were constructed (Figure 1). Figure 1A shows that a fast winter growth production method paired with a marketing date in September created more favorable results in comparison to it being paired with a marketing date in July. This is evidenced not only by a $19.80/steer higher average net profit for the September marketing date

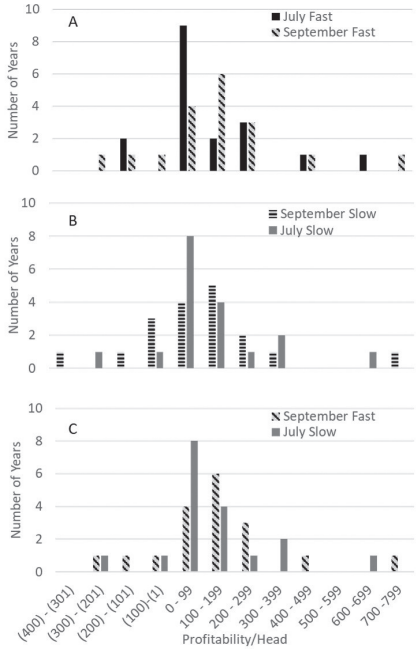

Figure 1.

over the 18-year analysis, but also an increased number of times net profits exceeded $100/steer. However, the fast September method also created one more year of net loss than marketing in July. In examination of the July FAST scenario, it significantly increased the number of years that generated a net profit between $0 and $99. However, this was outweighed by the fact that the September method generated four more occurrences where net profits were above $100. The September method also showed an instance where net profit was greater than $700, which the July method was unable to do. In summary, retaining the steers through September created slightly more risk but more instances of higher profit in the fast winter growth scenarios.

When examining the slow growth method paired with marketing dates in July and September (Figure 1B), it was found that net profits were shifted towards the negative when comparing September SLOW to July SLOW. The September SLOW scenario had three more instances of negative net profits and an average net profit $15.68/hd below the July SLOW scenario (Table 2). This is primarily because of the price slide. Steers in the slow winter growth scenarios were assumed to weigh an average of 915 lbs. in July and the average market price for that weight and time was $126.95/cwt. over the 18 years of data. In September, they were assumed to weigh an average of 1,005 lbs. and the average market price for that weight and time was $117.16/cwt. This is different than the fast winter growth scenarios where the average July weight and price were 1,010 lbs. and $118.96/cwt., respectively, while September weights were 1,076 lbs. and September prices averaged $117.16/cwt.

Finally, a comparison of the two best scenarios, September FAST and July SLOW, is shown in Figure 1C. While there is one more instance where the September FAST scenario results in a negative net profit, this is more than counterbalanced by three more instances where the September FAST scenario results in net returns above $100/hd.

By increasing the maximum profit that a producer is able to create and increasing the average net profit overall, it was found that utilizing a fast winter growth method combined with holding steers until September was the most profitable scenario for producers to utilize. In addition to this, it was found that producers who utilize slow winter growth will realize higher profits by marketing in July in comparison to September, and that marketing in July yields nearly the same average profitability no matter the winter growth method used.

The data was also analyzed using futures contracts as a marketing tool, and it was found that net profit was decreased by an average of $18/head when a futures contract was included each year. However, a futures contract position greatly reduced the amount of money lost during years where there were significant drops in livestock auction prices, as was the case in the fall of 2016. In 9 of the 18 years analyzed, net profits were increased by utilizing futures contracts, and 9 years where profits were decreased by utilizing futures contracts. Unfortunately, there were also not any predictive measures found in this study that might help producers decide when it is profitable to utilize futures contracts. This is evidence of market arbitrage principles that result in futures contract price offerings being the best predictor of futures contract settlement prices. It is important to note there were no years analyzed where using cattle futures contracts resulted in a net loss when a producer could have realized a net profit without using futures contracts. This analysis showed that futures contracts could be used to protect against cyclical patterns that seem to show low cattle auction prices coming directly after extreme high cattle auction prices but that protection comes at a cost of about $18/head with no great predictors as to when it is not needed.

Because of limitations in data available from the USDA on LRP insurance, only three years could be analyzed using LRP as a market price risk management tool. Of those years, the years 2016 and 2018 resulted in an indemnity payout to the producer. In 2016, this payout was enough to turn what would have been a net loss of $276.56/head without LRP insurance into a net loss of $105.72/head. In 2018, the indemnity payout was not enough to cover the entire cost of the LRP premium paid, and resulted in decreasing the net profit by $46.91/head, turning what would have been a net profit of $134.80/head without LRP insurance into a net profit of $87.89/head. In 2017, there was no indemnity payout, resulting in an added cost of $63.65/head for the producer to pay for the LRP premium. This added cost turned what would have been a net profit of $439.78/head without LRP insurance into a net profit of $376.13. Overall, by utilizing LRP insurance, a producer would have increased their average net profit over those three years by $20.09/head.

When using the production methods assumed in this study, the net profits were largely driven by cattle market prices. A driving factor in the results of this study is the higher weight that cattle achieve when using the fast winter growth method in comparison to the slow winter growth method. When utilizing the fast winter growth method, both the July and September cattle exceeded 1000 lbs in weight (1010 lbs in July and 1076 lbs in September) so they fell into the same CWT price category. This resulted in an average September market price that was only $1.80/CWT below the average July market price. However, the September cattle received a higher overall sale price per head due to the added 67 lbs of weight. Even though it costs

slightly more to retain the cattle on grass until September, the greater overall revenue outweighed the extra input costs of utilizing a marketing date in September.

Many producers in Nebraska have stated a belief that marketing cattle in July yields a greater price in comparison to September. Given the scenarios used in this study this was only partly true, in the case when utilizing slow winter growth. When utilizing the slow winter growth, it was more profitable to market in July as compared to September. The reason for this is that steers in the slow growth scenario cross the 1000 lbs threshold by being held until September, going from 915 lbs in July to 1005 lbs in September. This increase in weight decreases the average sale price per CWT by $11.14 as the animal changes weight categories, negating the reduced costs associated with the slow winter growth method, and ultimately decreasing overall net profits.

Another finding of this study is the most extreme high and low net profit years occurred in the same years across all four scenarios. The year 2014 was found to be a significantly higher year for net profits as market prices were high and holding value. The year 2016 was a significantly lower year for net profits as prices were trending down. Noticing these extreme high and low values, it was initially thought that there could be a potential for these data to provide a predictive value in determining when markets might be best suited for July or September selling to capitalize on the extreme highs and avoid extreme lows. However, this was not the case. Across almost all individual years, it nearly always worked best for producers to hold cattle until September and utilize fast winter growth. Even Livestock Risk Protection insurance predicted prices were not very good indicators of future prices. While they were quite accurate on average over a number of years, in a specific year the predicted price could be as much as 25% higher or lower than the actual price turned out to be.

The results of this study also indicate that the use of Livestock Risk Protection can help mitigate risk for producers who are not financially able to take the kinds of major losses that can occur in years such as 2016. However, although the analysis showed that producers would realize an increase in net profit over the three years use of LRP was examined, this may be somewhat misleading due to the small number of years studied and the significant indemnity paid out in 2016. Therefore, producers who are financially stable enough to incur major losses in a single year and still be able to operate in the following year may not need to use LRP, as doing so might decrease the average net profit of the operation in the long run. A similar statement can be made about using cattle futures as a marketing tool to protect against risk. While it will decrease the average net profit of an operation over a number of years, it does have the ability to protect against particularly bad years where major losses occur.

Implications

Overall, this study indicates that wintering practices for retained calves and summer grazing plans need to be considered together. A fast winter growth scenario coupled with summer grazing through September resulted in the highest average profit among the four scenarios studied. If a slow winter growth practice is utilized, there is a financial incentive to market the calves off grass in July to avoid potential price slide impacts in late summer as the calves transition from below 1,000 pounds to above 1,000 pounds per head. Fast winter growth practices diminish this risk and increase the incentive to retain the calves through September to yield the highest net profit.

Michael Merical, Undergraduate Student, Nebraska Wesleyan University, Lincoln

Mary Drewnoski, Associate Professor, Department of Animal Science, University of Nebraska–Lincoln

Jay Parsons, Associate Professor, Department of Agricultural Economics, University of Nebraska–Lincoln