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Historical Evaluation of Yearling Grassers

The Canadian beef production system with the majority of calves born over a relatively short period of time in the spring requires a variety of production systems in order to spread out slaughter year round for consumers. Consequently, light weight calves are either backgrounded over the winter before being sent to the feedlot or go to grass as yearlings before entering the feedlot.

The economics of yearling grassers fluctuate with feed grain prices. When feed grain prices are high, it is typically cheaper to put more pounds on with forages. Conversely, when feed grain prices are relatively low, it is cheaper to put those pounds on in the feedlot. This relationship has historically resulted in a market signal to producers to either place more or less cattle on grass as yearlings.

This fact sheet evaluates when it has been the most profitable time to sell yearling grassers historically and what are the drivers influencing net returns. Specifically, scenarios are examined of how margins are impacted by seasonal productivity declines in grass quality and daily gains; different starting weights and purchase price; the impact of spring feeding and backgrounding.

HISTORICAL REVIEW: 2009-2019

Over time the typically selling weight of yearling grassers has increased from 750 lbs to 850 lbs and now over 900 lbs. The Net Returns to management for backgrounding yearlings on grass are reviewed from 2009 to 2019. It is assumed that a 650 lb yearling is purchased and put out on pasture May 1st of each year with monthly average weight gains for tame pasture and native pasture (see Table 1) used to estimate the finish weight and subsequent gross revenue from sale at various weeks throughout the summer (August through October). Weight gains vary with pasture type, a non-legume mixed grass tame pasture

typically produces a weight gain on yearling cattle between 1.25 and 2.5 lbs per day; while a short grass native prairie averages gains between 0.8 to 1.5 lbs per day.

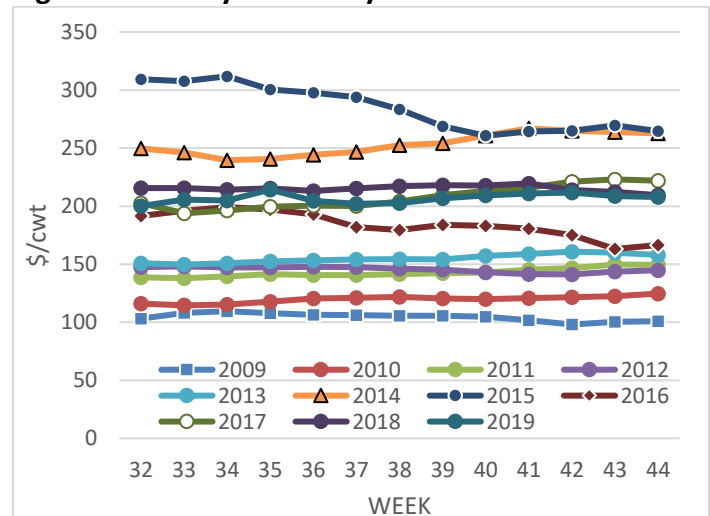
Table 1: Pasture Weight Gains (average lbs per day)

	May	June	July	August	Sept	Oct
Tame	1.9	2.0	2.0	2.0	2.0	1.9
Native	1.25	1.25	1.25	1.25	1.25	1.25

Market Prices

The market prices for weeks 32 to 44 (August to October) are presented in Figure 1; assuming a 650 lb feeder is put onto grass May 1st using tame grass weight gains from Table 1. The weight category is adjusted throughout the summer. Half of the time prices fell in October relative to the prices in September (2009, 2012, 2015, 2016 and 2018); and prices rose in October the other five years (2010, 2011, 2013, 2014, 2017 and 2019). Significantly higher variance in the weekly prices occurred in 2014, 2015, 2016, and 2017; on average 16 times higher than that for the other years. Larger volatility and seasonal swings were seen as cattle prices more than doubled during this period before stabilizing.

Figure 1: Weekly Prices July to Oct 2009 to 2019

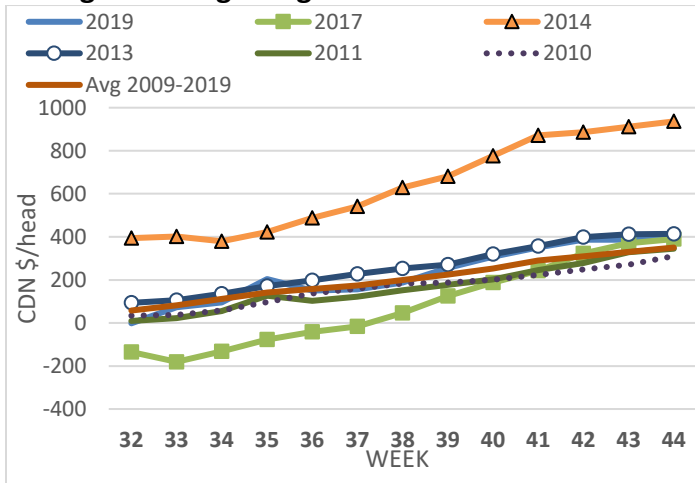


On average market prices peak at week 41 (the first week of October) and decline throughout October. Although prices fell significantly from week 32 (the beginning of August) to week 44 (the end of October) in 2015 and 2016.

Annual Returns

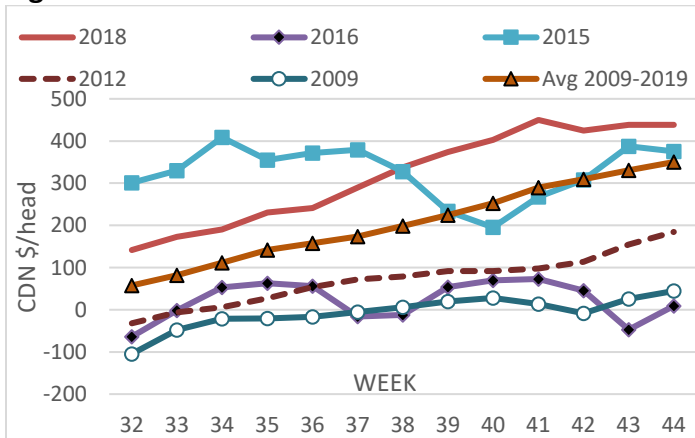
In general, the rate of increase in net returns slowed in October (week 41) except for 2012. In most years the trend is for increasing net returns until week 41-42 (See Figure 2). This is the result of market prices in October dropping faster than the cost of gain, which is declining at a slower rate at the end of the grazing period.

Figure 2: Net Returns Tame Pasture increase throughout the grazing season



The exceptions were 2009, 2015 and 2016; where the net returns are relatively flat throughout the grazing season (see Figure 3).

Figure 3: Net Returns Tame Pasture



Low cost of gain years were 2009 and 2010 at \$79/hd with the high cost year being 2015 at \$136/hd which is mainly due to interest charges on the cost of the grasser (Table 3). The highest return for most years is in week 44, except for 2018 and 2016 at week 41 and in 2015 at week 34. Fixed costs increase over this period as land values increased on average 5% per year. The land cost reflects the opportunity cost of holding the land asset.

Table 3: Tame pasture Costs and Net Returns¹ (\$/hd)

Year	2009	2010	2011	2012	2013	2014
VAR	79.34	79.23	94.76	97.40	94.85	113.43
Fixed	98.84	98.90	104.11	107.21	110.46	114.32
Net	44.49	310.57	344.90	184.46	413.91	936.25
Year	2015	2016	2017	2018	2019	AVG
VAR	136.38	113.78	116.75	114.61	120.75	105.71
Fixed	118.35	122.24	126.45	130.60	136.15	115.24
Net	375.77	8.83	389.60	438.45	406.03	350.16

1. At week 44

Var – operating costs Fixed – fixed costs; Net – Net Return

The net returns to grazing yearlings over the 2009-2019 period on short grass prairie are presented in Figures 4 and 5. While the weekly pattern for net returns is similar for native and tame pasture, native pasture had lower net returns.

Figure 4: Net Returns Native Pasture (increasing)

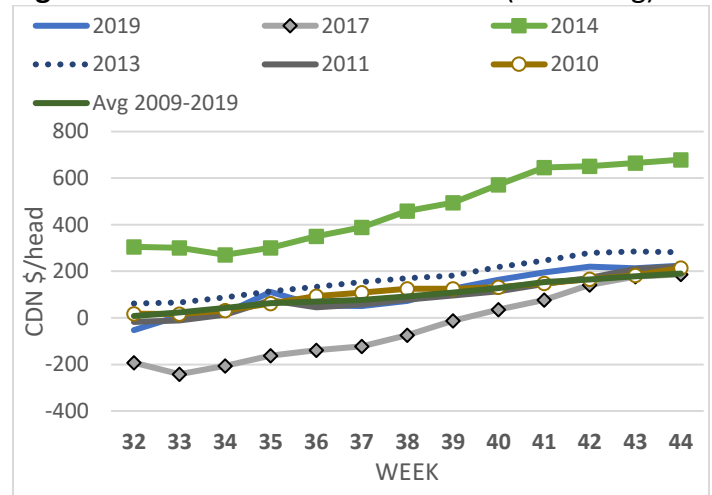
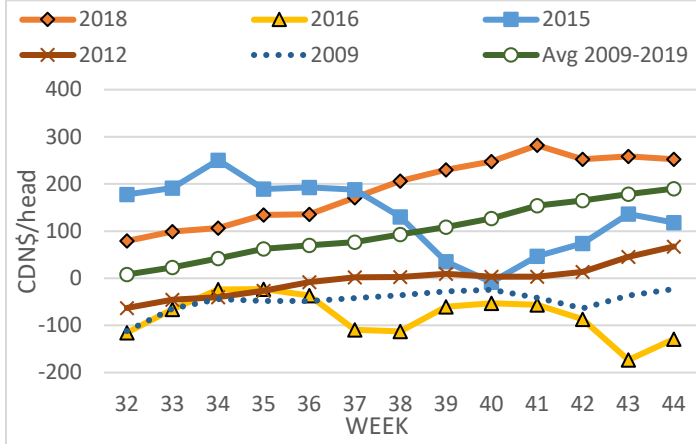


Figure 5: Net Returns Native Pasture (variable years)



Similar to tame pasture, native pasture had low cost of gain in 2009 and 2010 with the high cost year being 2015 (Table 4). The low average daily gain of native pasture may not be optimal for backgrounding, other options such as cow-calf pairs or supplemental feeding may give higher net returns.

Table 4: Native Pasture Costs and Net Returns¹ (\$/hd)

Year	2009	2010	2011	2012	2013	2014
VAR	79.34	79.23	94.76	97.40	94.85	113.43
Fixed	44.29	44.33	47.45	49.31	51.27	53.58
Net	-22.91	214.27	220.79	67.41	281.99	679.24
Year	2015	2016	2017	2018	2019	AVG
VAR	136.38	113.78	116.75	114.61	120.75	105.71
Fixed	56.00	58.33	60.86	63.35	66.68	54.13
Net	117.96	-128.82	186.74	252.41	224.16	190.16

1. At week 44

Var – operating costs Fixed – fixed costs; Net – Net Return

Note that for both tame and native pasture the return before fixed costs are deducted is positive for all years which means that a shutdown point was not crossed. A firm will keep producing in the short run as long as all variable costs are covered. Native pasture and low fall gain on tame pasture scenarios had negative net returns for 2009 and 2016. This is consistent with what Irisarri *et al.* (2019) found that long term profitability is affected more by inter year net returns than by the variable net returns in a given year. The question is whether there are enough years with high net returns to compensate for the poor years. The long run survival of an enterprise requires that all

costs both fixed and variable are covered as well as a return to management.

Scenario 1: Low Fall Productivity

Selling at week 41 appears to be the optimal strategy for 3 of the 11 years if the rate of gain in October remains relatively high. But what happens if pasture productivity drops in September and October? This may be caused by drought or other adverse weather conditions.

The average daily gains on the tame pasture with low fall productivity are presented in Table 5. September average daily gains are at the low end of the range for normal pasture conditions, while October weight gains are consistent with poor pasture conditions.

Table 5: Tame Pasture Low Fall Gains (Lbs/day)

May	June	July	August	Sept	Oct
1.9	2	2	2	1.25	0.3

Net returns are simulated for historical years assuming low fall pasture productivity and are shown in Figures 6 and 7. On average the profitable week for the low fall pasture scenario is 1.6 weeks earlier, as weight gain does not compensate for the decline in market price or the increased cost of gain caused by the drop in average daily gains.

Figure 6: Tame Pasture Low Gain Sept-Oct

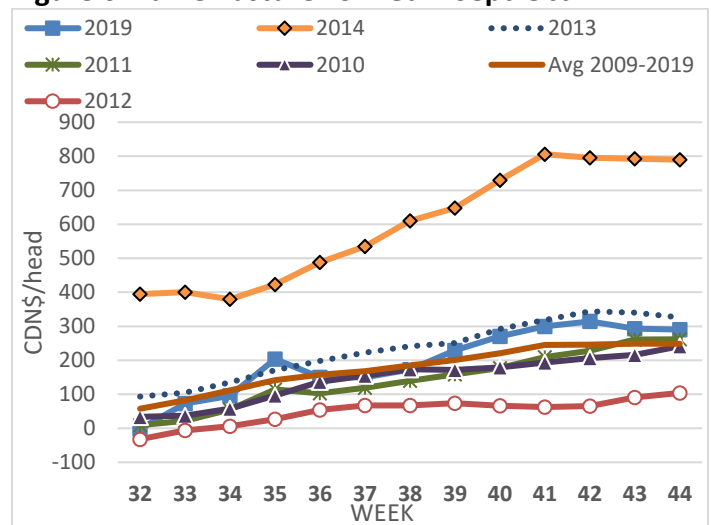
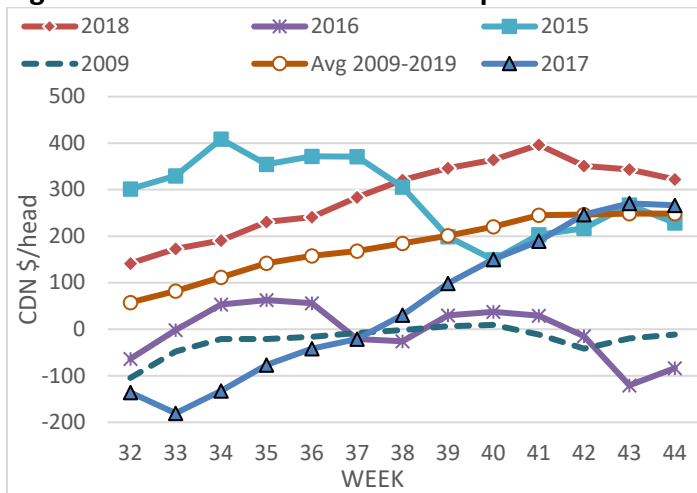


Figure 7: Tame Pasture Low Gain Sept-Oct



On average the net returns for low fall gains are \$100 per head less than for the tame pasture. Negative returns for 2009 and 2016 being the main difference (Table 6).

Table 6: Low Fall Gain Net Returns¹ (\$/hd)

Year	2009	2010	2011	2012	2013	2014
Net	-11.55	241.23	261.82	104.06	326.08	790.21
Year	2015	2016	2017	2018	2019	AVG
Net	228.63	-83.80	266.22	322.04	290.51	248.54

1. At week 44

Net – Net Return (\$/hd)

Scenario 2: Different Starting Weights

Net returns are compared across four starting weights of feeders bought in early May and pastured until they reach 900-920 lbs. The model is run for two options: owned pasture and rented pasture.

Purchase weights are 600, 650, 700 and 750 lbs with the monthly average for daily gain the same for all weights (Table 7). The average weekly market prices from July to October for 900 lb yearlings from 2009 to 2019 are used to estimate revenue. The per head cost of pasture checking, veterinary, medicine, buying and selling are the same for all the weight classes.

Table 7: Monthly Average for Daily Gain (Lbs/day)

May	June	July	August	Sept	Oct
1.75	2.00	2.00	2.00	2.00	1.75

Time to reach the 900-920 lb market weight is 157, 130, 104 and 78 days respectively for the 600, 650,

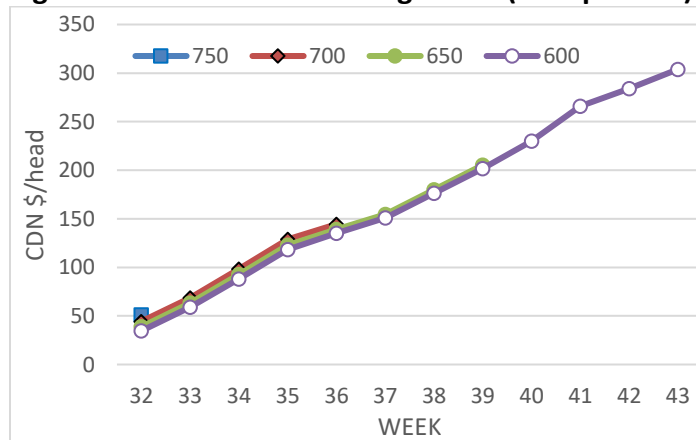
700 and 750 lb feeders. The time to reach market weight is used to estimate death loss, hired labour, and amount of vitamin/minerals consumed by each starting weight. Also, interest charges are estimated by multiplying the operating cost minus selling cost and death loss by the interest rate adjusted for days on pasture. Transportation cost of the yearlings to the pasture vary depending the purchase weight, as lighter weights results in more head per load.

The yearlings are sold once they reach the 900-920 weight with the average price for that week used to estimate the gross revenue. Operating and fixed costs for each option are estimated and subtracted from the gross revenue to get a net return to management.

Results

The 750 lb yearling would be sold at week 32, 700 lb at week 36, 650 lb at week 39 and the 600 lb would be sold at week 43. The results are presented in Figure 8 for the owned pasture option and Figure 9 for the rented pasture option. The returns are higher for the rented pasture since a daily rate is used however, the returns converge as the days on pasture increase. On average the discount in the purchase price from the 600 lb needed to make the net returns the same are \$0.15, \$0.23 and \$0.34, per lb for the 650, 700 and 750, respectively. For rented pasture the discounts are slightly smaller at \$0.12, \$0.17 and \$0.25, per lb for the 650, 700 and 750, respectively.

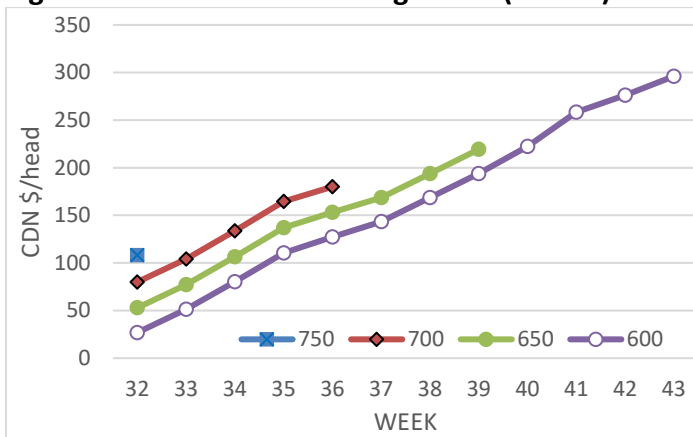
Figure 8: Net Return to Management (own pasture)



For both options the starting weight of 600 lbs has the highest net return. After week 41 the rate of gain in

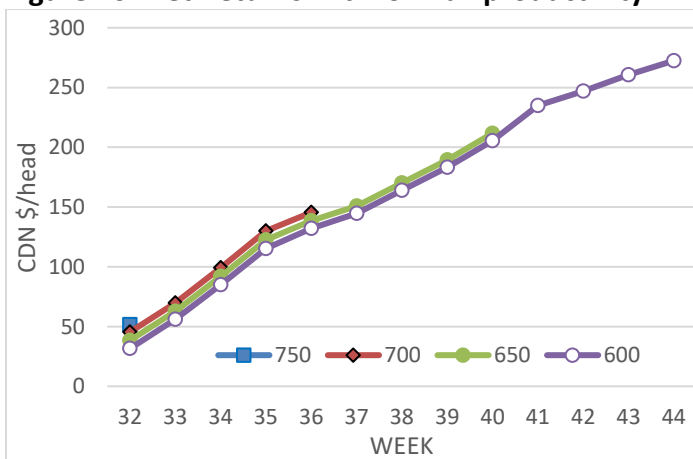
net revenue for the 600 lb yearling declines significantly. Lower market prices along with higher operating cost reduces the return. These results are consistent with Klopfenstein *et al.* (2020) who found that there was no clear benefit to marketing yearlings in July over September. However, Irisarri *et al.* (2019) found that removing yearlings earlier in September resulted in higher returns relative to October sales for U.S. producers.

Figure 9: Net Return to Management (rented)



The 600 lb yearling option had the highest per head operating cost due to the longer period on pasture. However, it also had the lowest cost per lb gained with 600 lb at \$0.38; 650 lb at \$0.43; 700 lb at \$0.48 and 750 lb at \$0.59 per pound gained.

Figure 10: Net Returns with low fall productivity



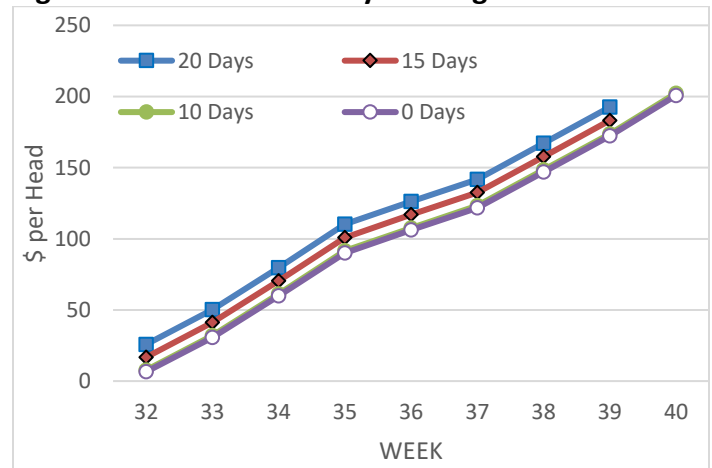
If there is a 25% reduction in the rate of gain for September and October, the highest net return is still the 600 lb yearling (Figure 10). However, the higher labour and operating interest charges along with

lower market prices reduces the net return when the sale is pushed back into October. The week to week increase in net returns slows from \$29.55 per head in week 41 to \$11.92 per head in week 42.

Scenario 3: Spring feeding

Feeding in May before pasture is ready, may be a reality in some years when grass is slow to start growing due to a slow thaw. This scenario compares the net returns when 0, 10, 15 or 20 days of feeding are required. The starting weight of the grassers is 650 lbs purchased on May 1st with the rate of gain for the month of May (lbs/day) at 1.25, 1.5, 1.75 and 2.0 as the number of days on feed increases. The ration is 3 lbs of barley and 14 lbs of hay per day. The grassers are sold when they reach 900 lbs. The results are presented in Figure 11 when using the average prices of the 2009 to 2019 period for grassers and barley. The net returns to the 0 and 10 day feeding periods are identical as the added cost negates any value of the weight gain. The 15 and 20 day feeding periods result in selling one week earlier (week 39) the end of September.

Figure 11: Net Returns May Feeding Periods



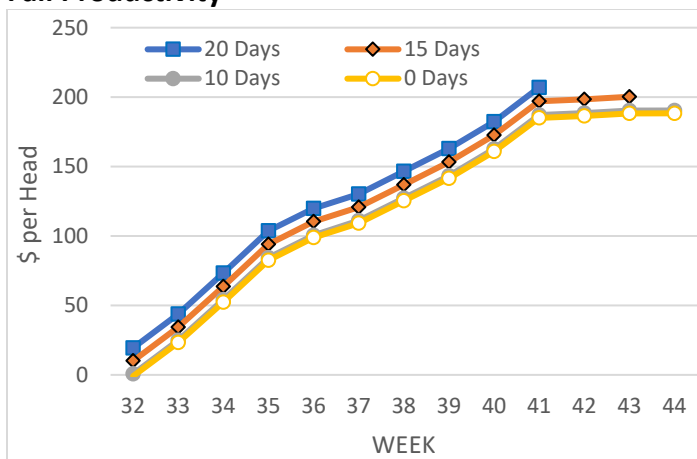
If there is also low fall productivity, then the returns would be like those in Figure 12. The most profitable option depends on how much the daily gain is reduced September through October (Table 8). Feeding the grassers for 20 days would be the best option in years with low fall productivity as net returns plateau for the other options after week 41.

Table 8: Spring Feeding with Low Fall Productivity

Days	May	June	July	August	Sept	Oct
0	1.25	2.00	2.00	2.00	1.25	0.30
10	1.50	2.00	2.00	2.00	1.25	0.30
15	1.75	2.00	2.00	2.00	1.25	0.30
20	2.00	2.00	2.00	2.00	1.25	0.30

Average Daily Gain (lbs/hd)

Figure 12: Net Returns with Spring Feeding and Low Fall Productivity



Scenario 4: Backgrounding feeders for grass

In order to avoid the spring rally in prices for feeders suitable for summer grass an alternative is to purchase in the fall and background. This provides the ability to control weight gain; but does require the facilities, feed and presents risk of animal health issues with managing fall weaned calves.

The net return to 400 lb calves purchased Nov 1st and backgrounded until April 30th then put out on pasture is evaluated. Four rations which produce four different weight gains over the winter are used to highlight the range of outcomes (see Table 9).

Table 9: Feed Ration and Weight Gain (lb/day)

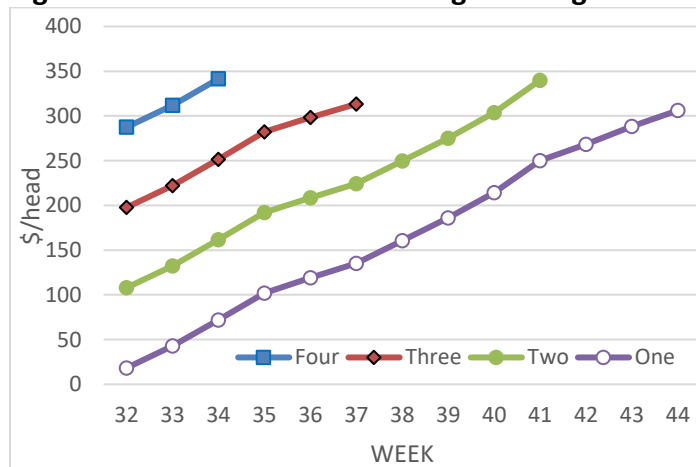
Feed	Options			
	One	Two	Three	Four
Barley (lbs/day)	2	2.5	3	3.5
Hay (lbs/day)	14	13.5	13	12.5
Avg Daily Gain	1.00	1.25	1.50	1.75
May 1 st Weight	581	626	671	717

In order to have a suitable starting weight for grass in the spring a lower average daily gain is used (1.0 to

1.75 lb/day) rather than the recommended 1.5 to 2.0 lbs per day used for backgrounded cattle headed to a finishing feedlot in the spring.

The net returns to the four options are presented in Figure 13. On average option four produced the highest returns. Klopfenstein *et al.* (2020) found that heavier winter gains of 1.5 to 2.0 lb/day were more profitable, both after grass or after feedlot, than winter gains less than 1.0 lb/day. Yearlings compensated for lower winter gains while on grass, but those gaining more in the winter gained better in the feedlot and produced heavier final weights.

Figure 13: Net Returns when Backgrounding Grassers



This analysis shows that option four at 1.75 lb/day was closely followed by option two (1.25 lb/day) as the most profitable; as the grasser reaches the targeted market weight at week 41 (usually the first week of October) – which is the ideal marketing period and before lower weight gains in October.

CONCLUSIONS

Selling at week 41 appears to be the optimal strategy for 3 of the 11 years if the rate of gain in October remains relatively high. But if the rate of gain is expected to fall in September/October then selling 1.6 weeks earlier is the optimal strategy. On average over the 2009-2019 period selling in week 44 produced the highest return on tame pasture at \$350.16/hd, with a range of \$8.83 to \$936.25/hd. The challenge is to come up with a marketing/production strategy that limits the downside risk of getting an \$8.83/ hd return while capitalizing on any upside gains.

A producer's estimate of the carrying capacity of the pasture given the forecasts of the pasture growing conditions would also affect choice of starting weight and whether to feed in May.

A yearling with a higher weight may be a better option if the rate of gain falls off in August and September. The rate of gain in October would have to fall to 0.31 Lbs from 1.75 lbs per month for there to be no benefit from keeping the yearlings past week 41 (usually the first week of October). If a producer has a pasture that produces high weight gains into September and October, the 600 lb starting weight gives the highest net returns on average.

Since, 10-year average weekly market prices were used for this analysis, higher net returns to heavier starting weights are likely in years when there is a price spike in August or September. Knowing your cost structure and locking in a futures price for the weight class you intend to buy would be the optimal strategy.

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