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The Economics of Preg-checking

As cow-calf margins tighten, producers are looking for ways to cut costs to support margins. It is time to scrutinize every cost. The first place typically looked at is around winter feed, which accounts for over 50% of the total cost of keeping a cow. All cost cutting measures needs to be examined to light of the impact on herd health, productivity and ultimately per unit cost of production. Any action that reduces reproductive efficiency can end up costing more than it saves.

Each year, a producer is faced with the decision of whether or not to preg-check; this decision can have a significant impact on the producer's bottom line. There are many factors that must be considered in the decision to preg-check including economics and herd fertility.

The Western Canadian Cow-Calf Survey reported the conception rate for all females was 92.8% in 2013 down from 95.6% in the 1997/98 Alberta survey. There are more open cows now than 15 years ago. In general, cull cows make up between 15-30% of cow/calf producer income¹. The management of cull cows is not an insignificant portion of the operation.

The value of a cow in a cow-calf operation is dependent on many parameters, some of which are within the producer's control including the type of winter feeding management system and feeding period. Conversely, producers cannot control some variables, namely the market price for cattle or feed.

INTRODUCTION

Preg-checking (pregnancy-determination) of cows has been promoted by veterinarians for over sixty years. The benefits of preg-checking include: evaluation of herd or bull fertility, identification of calving date, and the most obvious economic benefit is the cost-saving of wintering open cows.

3 ways to preg-check

1. **Rectal palpation.** At 45 to 60 days post-breeding, this method allows producers to have immediate results

while the cow is standing in the chute. The biggest drawback, is human error based on the skill level of the technician.

2. **Ultrasound.** Another option for immediate results is ultrasound. This method offers high accuracy readings at 28 to 35 days-post breeding. Technicians can also determine the sex of the calf based off the ultrasound. There is some additional cost for the technician and technology. As well as longer time needed chute-side.

3. **Blood test.** Highly accurate—with a 99% detection of open females and 95% detection of bred females. Tests must be taken at least 28 days post-breeding and at least 75 days post-calving. Females can't be sorted out right from the chute as tests often take a couple of days to be processed. Collecting samples requires little training and can be done by producers. This works best if producers use individual identification system for females, so open cows can accurately be found and sorted out from the group when the test results are returned.

It has frequently been noted that preg-checking is not worthwhile, because seasonally prices increase going into the spring (Feb/March) period. As long as the cost of feed is lower than the spring price it frequently made sense to feed cows over the winter. This was re-enforced over the last decade as cow prices recovered from the BSE lows and we not only saw seasonal prices increases but year over year increases in cow prices. Now that fed cattle prices have peaked and realigned with the long-term average, we anticipate more seasonal price patterns moving forward.

The 2015 Western Canadian Cow-Calf Survey reported that 60% of producers include preg-checking as part of their management strategy, up from 49% in the 1997/98 Alberta Survey. A survey of Saskatchewan cow-calf producers found that about 50% of cow-calf producers' preg-checked their animals, with the larger operations (> 124 breeding animals) being nearly twice as likely as the smaller operations to preg-check. There are market reasons why 40% of producers in Western Canada choose not to preg-check their cows.

¹ 10-20% Nebraska 2012, 18-24% agri-benchmark 2015

Cow-calf producers generally have three options for open cows.

1. **Fall culling** - Preg-check and cull in the fall. This immediate marketing of open animals provides the producer with cash-flow and minimizes additional overhead costs associated with keeping the open animals.
2. **Short-term feeding** - Preg-check in the fall and feed open cows as a separate group to market at a later date. By feeding the groups separately, the producer can place the cull cows on a high-energy ration to gain more weight. This also avoids the lower market prices in the fall.
3. **Overwintering** - Do not preg-check, overwinter all cows and cull opens in the spring after calving.

The economics of preg-checking and selling cull cows depends on the:

1. Cull cow market price – price seasonality
2. Winter Feeding Management system:
 - a. Feed costs and yardage
 - b. Average Daily Gain and final weight
3. Veterinary costs

An economics of preg-checking model was developed by Muzzin and Ben-Ezra (2015) to account for these factors and assist cow/calf producers to determine which of the three above options makes the most sense for their operation.

THE MODEL

The model reframes the conversation on preg-checking from minimizing costs to a focus on maximizing cow value. The models use the following formula to determine the net benefit of preg-checking and culling in the fall:

$$\text{Gain/head} = \{(\text{Overwintering cost} + \text{value of cow in fall} - \text{value of cow in spring}) \times \text{herd open rate}\} - \text{Veterinary cost}$$

Where:

$$\text{Overwintering cost} = \text{daily cost of production} \times \text{days in winter feeding period}$$

$$\text{Value of cow in fall} = \text{fall weight} \times \text{fall market price}$$

$$\text{Value of cow in spring} = \{ \text{fall weight} + (\text{average daily gain over winter} \times \text{days in winter feeding period}) \} \times \text{spring market price}$$

$$\text{Veterinary costs} = \text{costs per head to pregnancy check}^2$$

² Derived from a survey of 29 veterinary clinics located in Alberta and Saskatchewan.

The gain/loss per head applies to all cows in the herd; both pregnant and open. This was because the decision to preg-check must be made before the herd pregnancy rate is known. The comparison or default is assumed to be not preg-checking and selling cull cows in the spring after calving. Hence, a positive number (or gain) would indicate either the fall culling or short-term feeding option is more profitable than the not preg-checking alternative.

Fall Culling		Short-term feeding	
Economic gain	Economic cost	Economic gain	Economic cost
Overwintering cost of open cows avoided	Vet cost of preg-checking the herd		Overwintering cost of open cows (supplemental feed)
Value of open cows realized in the fall	Additional value of cows in the spring forgone	Additional value of fed cull cows in the spring realized	Vet cost of preg-checking herd Value of open cows in the fall forgone

PREG-CHECKING CALCULATOR

The Preg-Checking calculator provides the gain/loss per head of cattle of preg-checking and culling open cows in the fall compared to overwintering and culling in the spring. It is important to note that in the model the gain/loss per head applied to all cows in the herd, both those that are pregnant and open. This was because the decision to preg-check must be made before the herd pregnancy rate is known. There are two options:

- 1) **The basic model** - requires only six pieces of information: herd size, type of management system, the month they plan to preg-check, the anticipated calving month, and the current fall month and market price.
- 2) **Advanced model** – allows producers to enter custom data for their herd including: cost of production, ADG, length of winter feeding period, herd open rate, and veterinary cost to more accurately calculate the net gain or loss of preg-checking for their situation.

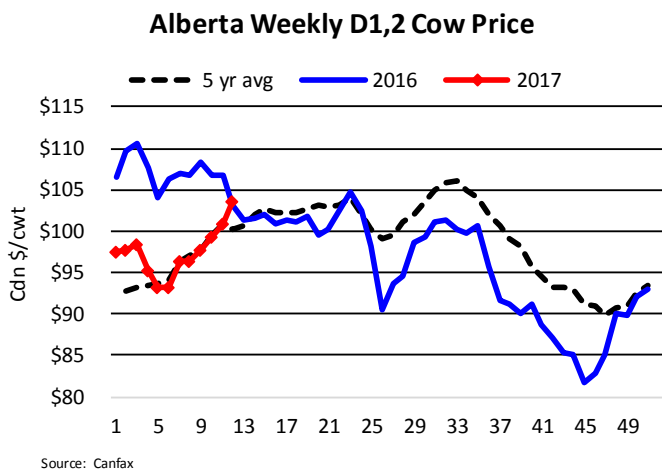
Both models have the option to enter parameters for **feeding cull cows as a separate group**. By entering feed and overhead cost, the number of days they plan to feed, and the ADG they expect to attain for the group, the model will calculate the expected gain or loss of preg-checking in the fall and feeding cull cows as a separate group.

The calculator is available at:

<http://www.beefresearch.ca/economicmodel/pregnancy-detection.cfm>

THE VALUE OF THE COW

The value of the cow is determined by (1) market price and (2) weight of the cow. Both will vary depending on the time of culling. If an open cow is culled in the fall, the producer gains the value of the cow in the fall, at fall market price and fall weight. If the producer does not preg-check and instead culls open cows after wintering them, they gain the value of the cow in the spring, at spring market price and spring weight. Both the market price and weight of the cow will be different between the fall and the spring, with price seasonality and average daily gain over the winter.



The incentive to retain your cows until spring will depend on the condition of your cull cows in the fall. If they are fat on grass and little potential to gain weight over the winter the only gain is the seasonal price increase. Whereas if they are on the thin side by feeding them you could gain both the price increase and additional pounds sold.

The average daily gain (ADG) of cull cows over the winter feeding period has an impact on the cow's spring value; higher weight gains over the winter result in higher spring values than low weight gains, regardless of the market price. The goal of feeding for a targeted ADG is to increase at least one quality grade. A 10-12 cent/lb (\$10-12/cwt) increase in price can be expected when improving grades from a D3 to a D1/2 in the January to May time period.

WINTER FEEDING

The primary economic gain of preg-checking and culling cows in the fall is that producers avoid incurring the cost of wintering open cows. In western Canada, the average cost of production for one cow in the winter ranges from

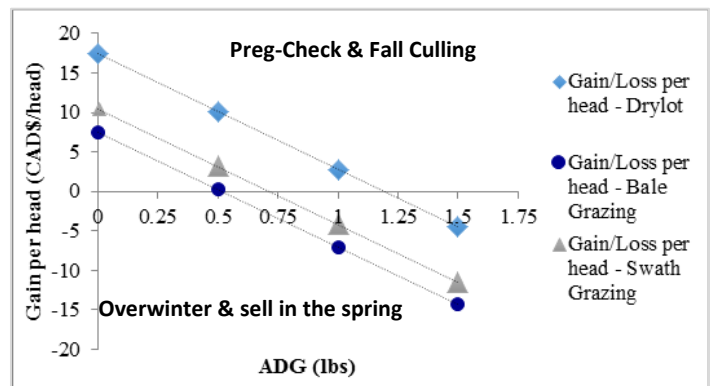
\$0.98 to \$1.78/day depending on the management system used.

Over an average winter period of 160 days, producers will save between \$156.80-\$240.80 per open cow identified and culled; producers who feed longer will gain even more. However, total wintering costs are largely determined by the cost of feed. Feed costs typically account for 59.5% of total winter feeding costs. Since feed costs are highly variable and difficult to forecast, the Advanced preg-checking calculator allows producers to enter their own cost of production.

Conclusion #1: The higher a producers feed and overwintering costs the more favourable preg-checking and culling cows in the fall.

Three different western Canadian overwintering feeding management systems: drylot mixed hay, swathed barley grazing, and bale grazing, were examined. The costs of production and ADG associated with each system were derived from published reports (and are included in the Basic preg-checking calculator).

The point where preg-checking makes sense changes with the winter management. Anything above the line, in the below chart, recommends preg-checking. For example, if you dry-lot with ADG <1.2 lbs/day preg-check; but if the ADG is >1.2 lbs (that is below the line) it is recommended you winter feed. The higher the ADG the more likely winter-feeding and selling in the spring makes sense.



ADG varies with the management system (i.e. drylot mixed hay, swathed barley grazing, bale grazing). However, not every producer will realize the same ADG using the same management system due to other factors including cattle genetics or environmental conditions (e.g. harsh versus mild winter). What works for you, may not be what works for your neighbor even if you have the same winter management.

Conclusion #2: Lower ADG favours preg-checking and fall culling

The type of winter feeding management you have will impact performance (ADG) and hence decision on when to sell.

Management System	Cost of Production (\$/cow/day)	Breakeven ADG (lbs/day)	ADG From Literature	Decision
Drylot mixed hay	1.78	1.20	1.44	Sell in the spring
Swathed barley grazing	1.22	0.70	0.58	Preg-Check sell in the fall
Bale grazing	0.98	0.50	0.88	Sell in the spring

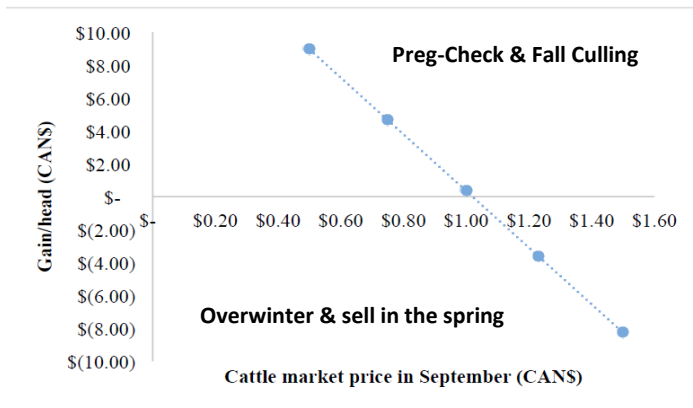
Conclusion #3: While you may have low feed costs which make it look like it would be attractive to feed and sell in the spring; but if your ADG is minimal that offsets some of the advantage.

SEPTEMBER COW PRICE

Consistently higher cull-cow prices in the spring can be a strong deterrent to preg-checking. Producers in western Canada that have overwintered their open cattle have received on average (2005 to 2016) a market price 20% higher than the previous fall (October to March). However, the seasonality is quite variable, ranging from 6% in 2006-2007 to 53% in 2009-2010.

Over the last ten years, producers have not benefited from preg-checking and culling open cows in the fall. The loss of potential income experienced by producers for preg-checking and culling open cattle in the fall was driven largely by cattle prices increasing both seasonally and annually.

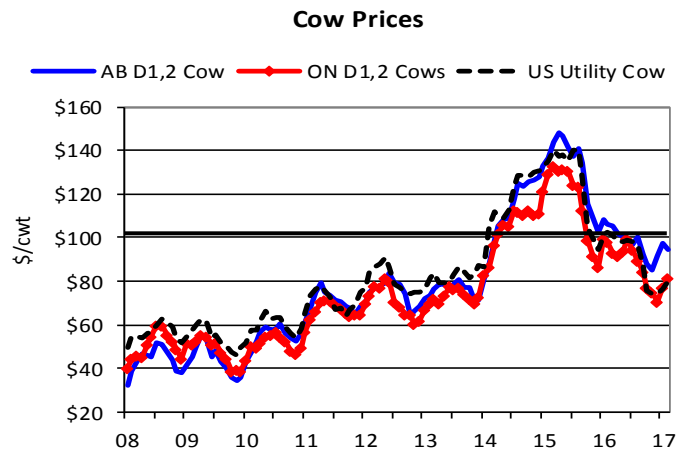
When cow prices are larger than wintering costs, it encourages producers to add pounds before selling. When the price is under the wintering cost, it encourages producers to sell.



The above chart shows the threshold for the drylot mixed hay cost of production. If cow prices drop below

\$102/cwt, the decision to preg-check and cull in the fall is favoured, as the cost of overwintering begins to outweigh the benefit of selling heavier cull cows in the spring. But any price above \$102/cwt favours short-term feeding to heavier weights.

Conclusion #4: Should cull cow prices drop to pre-2012 levels (below \$0.75/lbs), many scenarios indicate that preg-checking and culling in the fall is a better option as the cost of overwintering begins to outweigh the benefit of selling heavier cull cows in the spring.

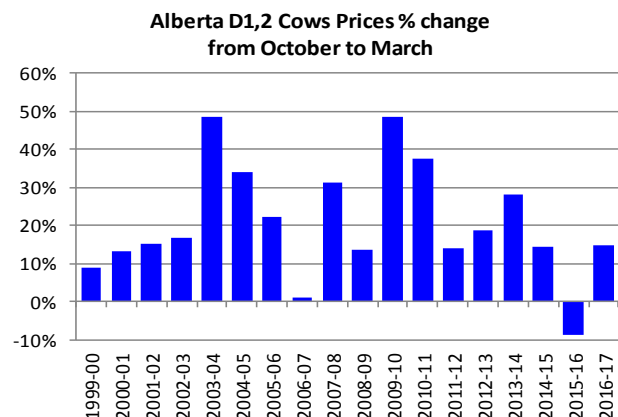


Source: CanFax

The Canfax average for D1/2 cows has been around \$100/cwt in the west, while eastern cow prices have dropped to around \$80/cwt. This is right around that threshold, where it makes sense for producers to take a hard look at their costs and management practices. As overall cattle prices dropped from the peak, they could favour preg-checking this fall.

Conclusion #5: Higher cull cow prices favour overwintering as every additional pound with worth more. Lower prices encourage preg-checking.

PRICE SEASONALITY

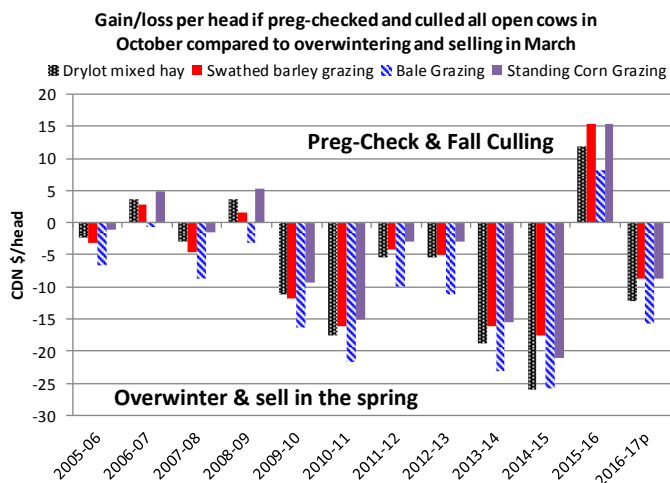


Source: Canfax

After seeing prices increase strongly year over year and from fall to spring, 2015/16 actually saw prices decline from fall to spring, before the fall-to-spring rally resumed in 2016/17.

Because of higher prices from fall to spring, delayed marketings received a higher price and every additional pound being more valuable. Thus preg-checking and cull cow in the fall was not profitable in most years.

However, as prices peaked in 2015-16 and came close to those thresholds, the simulated return of preg-checking was positive compared to overwintering open cows and sell in March.



Cow prices increased 15% from October 2016 to March 2017 resulting in the preg-checking options bringing in a lower return than if cows had been overwintered and sold in the spring.

Conclusion #6: Cow value is often a more important factor in the economics of preg-checking than either overwintering or veterinary costs. As cow prices have increased annually over the last decade, from the 2003 low, preg-checking has not been economically beneficial and producers have seen the greatest benefit from overwintering cattle and selling at the higher price.

Seasonality Scenarios

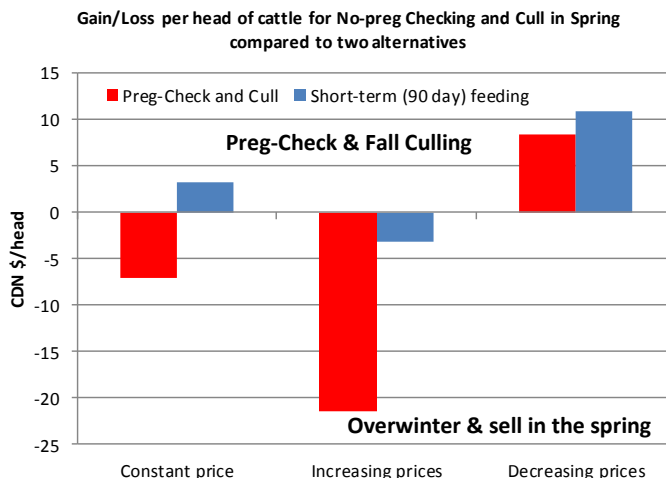
Various price seasonality scenarios were then applied to the model to examine the economics of pregnancy checking under the three management systems: fall culling, short-term feeding, and overwintering.

It was assumed that producers were utilizing a bale grazing overwintering system with a cost of production of \$0.98/cow/day with an average daily gain of 0.88 lbs over a 160-day winter feeding period, and a 7.7% herd open

rate. For the short-term feeding scenario, the cost of production was \$1.00/cow/day, average daily gain of 2.0 lbs, and a 90-day feeding period.

The economic gain/loss of pre-checking and culling all open cows in October and preg-checking and short-term feeding compared to no preg-check and cull in spring were examine under three price patterns:

- 1) **Constant** - The first scenario was a stable market environment of unchanging cull-cow prices that remained constant at \$1.00 /lb.
- 2) **Increasing** - The second scenario considered a market environment of increasing cattle prices, from \$1.00/lb in October, \$1.07/lb in December, and \$1.13/lb in March.
- 3) **Decreasing** - The final scenario considered decreasing cattle prices, from \$1.00 /lb in October to \$0.93/lb in December and \$0.86/lb in March.



The results are shown in the chart above. As expected when prices increase, preg-checking and selling in the fall is least profitable. However, when cattle prices decline from October to March, preg-checking and culling once again becomes favoured over no preg-check and cull in spring.

In a constant price and decreasing price scenario, short-term feeding can be profitable but overwintering depends on the cost of feed compared to the average daily gain over the feeding period.

Conclusion #7: Declining prices encourage preg-checking and increasing prices discourage preg-checking.

SHORT-TERM FEEDING

Preg-checking gives additional management options. The model shows that in some cases a larger economic benefit

could be achieved by preg-checking and feeding the open cows as a separate group to market at a later date when prices have recovered from the fall low. Particularly when the price rally from fall to spring is anticipated large, adjusting the winter feeding to add more pounds can pay.

The case when separate feeding of cull cows is a less favorable option is when the overhead costs of separately fed cows is very high and the number of days on feed is low – placing the market date in January when cow prices have been historically the lowest of any month during the year. Increasing the veterinary cost of pregnancy checking does not significantly affect either alternative unless the net gain or loss is very close to zero.

Research data South Dakota suggest that cows can gain from 2.5 - 3.3 pounds per day, depending on the length of the feeding period and the ration fed. Normally the shorter the feeding period, the higher the ADG will be. To increase at least one quality grade, cows should be fed a minimum of 50 to 60 days, but not over 100-110 days. If fed over 100 to 110 days, feed efficiency and rate of gain generally declines, as well as the risk of excess body condition on the cows which can cause these cows to be discounted in price.

Cull cows will need 20 to 24 inches of bunk space and should be worked up gradually to higher energy diets just like feedlot cattle to minimize metabolic disturbances. Cows need to be physically sound, healthy and in thin to moderate body condition for this kind of program. Cows that are carrying extra condition should be marketed directly to the packer. It should be remembered that cull cows are not very efficient and all possible management strategies need to be explored.

OPTION #4: REBREEDING OPEN COWS

A study (da Silva et al., 2016) in the U.S. reported that re-breeding non-pregnant cows after pregnancy check to be sold as pregnant fall-calving cows in a more favorable market prices could be a cost-effective strategy compared to selling non-pregnant spring-calving cows immediately. Even though fall calving is not a common practice in Canada, this could be considered, especially for pure-bred operations with an calving season in January to February and a commercial herd that calves in May to June.

In general, the best candidates for this strategy would be young females that have more productive life remaining. There are times when a bred cow is a cheaper option for expanding the herd than bred heifers. Things to consider

if rebreeding open cows include: the current value of a cull cow versus the expected future value after rebreeding, the cost of maintaining the cow and rebreeding versus the cost of developing bred heifers.

CONCLUSION

Previous debate about the cost-benefit of preg-checking centered around two factors: the veterinary cost of preg-checking and the feed cost of overwintering an open cow (Bridges et al.). Those in favour of preg-checking argued that from an economic perspective feed costs vastly outweighed the cost to preg-check, thus there was a large economic benefit of preg-checking and culling all open cows immediately.

From 2009 through 2015 this has not been the case with high cattle prices resulting in delayed marketings receiving a higher price and every additional pound being more valuable. When prices came close to those thresholds (\$102/cwt) in 2015-2016, it is estimated that preg-checking and culling cows in the fall or preg-checking and feeding them as a separate group could be more profitable compared to overwintering cow without preg-checking, depending on winter feeding management.

The economic model shows that cow value is often a more important factor in the economics of preg-checking than either overwintering or veterinary costs; and declining prices encourage preg-checking. As the North American cow herd has expanded and the cattle market is searching for a new trading range in the down swing of the price cycle, producers are examining ways to reduce costs. Reproductive efficiency is one of the key determinants of cow-calf profitability and should be prioritized.

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