SDSU Extension

BEEF

Chapter 48

Cull and Open Beef Cows

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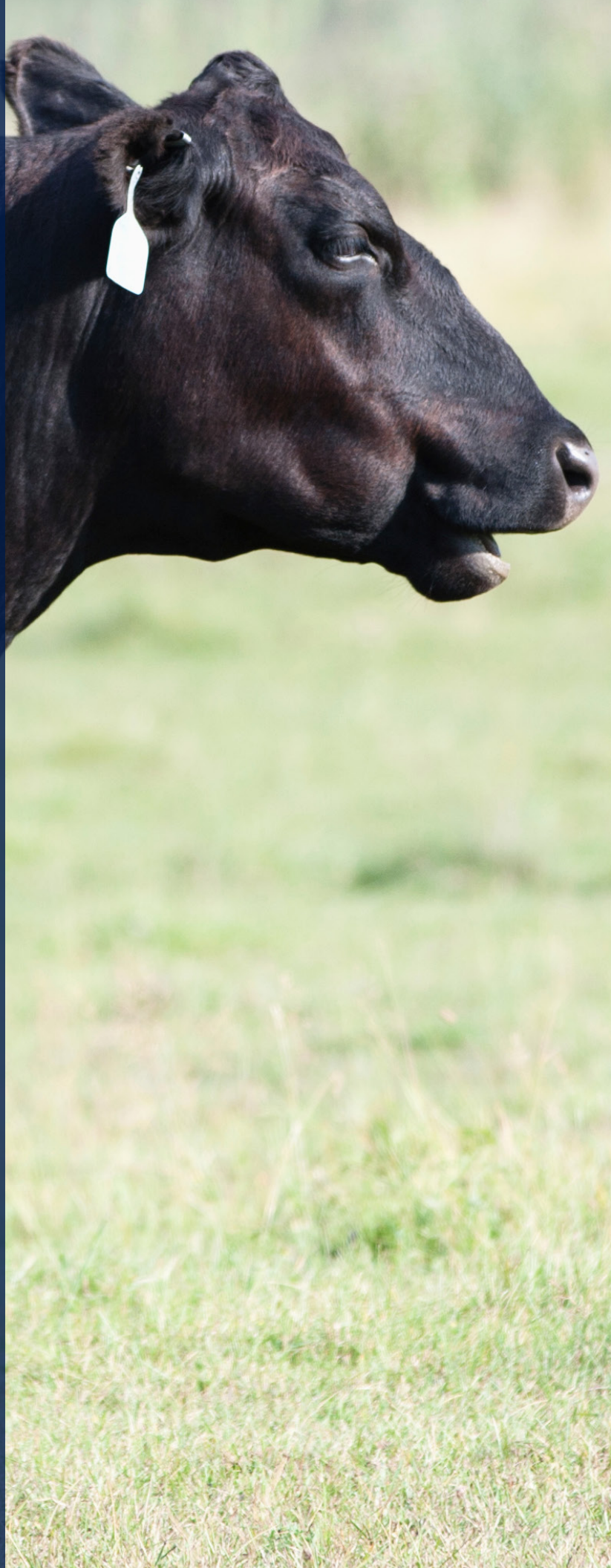

Chapter 48:

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Introduction

Beef cows are removed from the herd for various reasons, reproductive failure, age, below-average performance, and structure or confirmation issues. Depending on culling rate and prices, cull cow receipts can account for 15-25% of income for a cow-calf operation, making cull cows an essential income source in many cow-calf operations (Woerner, 2010). As a large contributor to an operation's income, the management of this enterprise should optimize profit.

Reasons to Cull

One of the largest reasons to cull beef cows is reproductive failure. Open cows decrease profitability as they consume expensive inputs (feed, AUM's, and labor) without contributing to the operation. Causes for not breeding back are many and varied and should be monitored closely by cattle producers.

The age of the cow is another reason to cull an animal from the herd. The Beef Improvement Federation (BIF, 2010) publishes adjustment factors for calf weaning weights based on its age. For cows 11 years old or more, the adjustment is +20 pounds for a male and +18 pounds for a female calf. With all other factors held constant, this indicates calves from older cows are likely to be 18 to 20 pounds lighter than calves from younger cows in their peak of production.

Older cows also require a higher plane of nutrition. Winter feeding recommendations often include feeding older cows with bred heifers to receive additional energy and nutrients. Thus, older cows typically have a higher daily feed cost than cows in their peak performance range of 5-10 years of age.

Below-average performance by the cow's progeny is another factor to consider when making culling decisions. Calf weaning weight is one standard benchmark that is important to the profitability of the cowherd. Cattle producers must individually identify cows

Key Points

- Open cows negatively impact profit as they consume expensive inputs (feed, AUM's, and labor) without contributing to the operation.
- The cull cow market follows seasonal trends. Typically, prices in South Dakota are the highest during the spring and summer months.
- Potential exists to increase the value of open and culled cows through feeding and management, which adds weight and increases body condition scores.
- Under most conditions, cull cows' feed efficiency is relatively poor; therefore, available growth promoting technologies can be incorporated to improve feed efficiency, weight gain, and muscling, ultimately increasing live and carcass value.
- Beef from cull cows accounts for 17-19% of the U.S. Commercial beef production.

and calves and keep offspring production records to determine which cows produce underperforming calves.

Structure, conformation, and disposition are other reasons cows for removal from the herd. Feet and leg structure are vital to longevity, especially if pastures are large and cows must walk long distances to water sources. Disposition is another culling reason. Working a cowherd that includes flighty or mean cows is dangerous for both the producer and other animals in the herd.

Cull Cow Market

The cull cow market follows seasonal trends. Cull cow prices in South Dakota are the highest during spring and summer months because cull cow slaughter drops as herds are typically grazing summer pastures (Figure 1). Identification of open cows commonly occurs during late fall or early winter, in conjunction with weaning and pregnancy diagnosis. It is not uncommon for open cows to be taken directly to auction following pregnancy diagnosis. As the cowherd is already sorted and easily accessible, it is easy for cattle producers with limited facilities or labor to deliver the cows to the sale barn at this time. The downside is that many open and cull cows enter the market at the same time. The increase in supply results in a seasonal price decline during the fall and early winter.

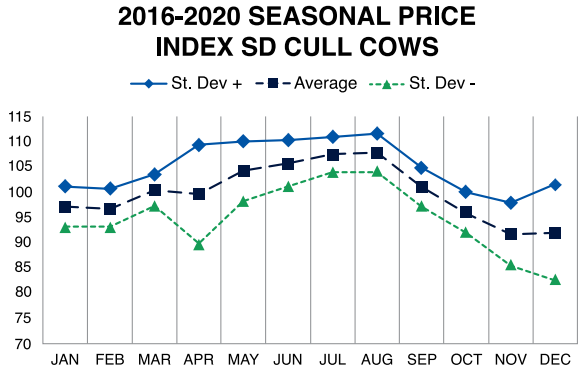

Figure 1: 10-Year seasonal price index – South Dakota slaughter cows. *Source: Prices are from USDA-AMS, via LMIC. Chart created by SDSU Extension. Note: Prices are for cows grading breaker and weighing 1200 to 1600 lb.*

Is There an Alternative?

The seasonal price pattern suggests selling these animals at a time other than late fall may improve profitability. The quarterly Livestock, Dairy and Poultry report issued by USDA- Economic Research Service (USDA-ERS) reports cull cow price projections.

The use of an enterprise budget can determine the cost-benefit ratio of keeping culls for any length of time. Consider the price and availability of feedstuffs and labor requirements when making this marketing decision. Table 1 shows a simplified comparison.

Table 1: Feed cost options for cull cow rations.

Option A	Option B	Option C
1200 pound cow sold at pregnancy check- November	On corn stalks with supplement November 15, 2013 to February 1, 2014	Ration and Yardage: corn, silage modified distillers grains, cornstalks November 15, 2013 to February 1, 2014
Gain		
	70 days at 2#/day ROG	70 days at 3#/day ROG
Cost of Gain		
	$1.00/hd/day feed and labor ($70.00)	$1.99/hd/day feed and labor ($140.00)
Sell At:		
1200 pounds	1300 pounds	70 days at 3#/day ROG
$79.00/cwt	$81.00/cwt	$81.00/cwt
Income minus feed costs:		
$948.00	$983.00	$994.00
Source: SDSU Extension		

Many strategies can be implemented to sell cows when prices are traditionally higher.

- Spring calving cows that lose their calves can be sold as soon as possible to take advantage of high spring prices.
- Early weaning also allows the sale of cows during the summer, providing dual benefits of higher summer prices and reducing grazing pressure, especially in drought years.
- Cows identified as culls, either due to poor production, pregnancy status, disposition, or other reasons, can be fed for a time to delay marketing until a more favorable time in the price cycle and to add value through marketing cows at heavier weights and with more desirable body condition scores.

Consider the End Product

It is imperative cattle producers think of cull cows as more than a byproduct of a cow-calf operation. Cull cows account for 17 to19 % of all the cattle slaughtered in the U.S. beef industry (Woerner, 2010). Carcasses from cull cows are used for wholesale and retail cuts and beef trimmings are used to produce ground beef and further-processed products.

According to the 2007 National Market Cow and Bull Beef Quality Audit, all cow and bull slaughter plants surveyed are fabricating and marketing ribeyes and tenderloins to capture the value of these cuts. A majority of plants are marketing subprimal cuts from the round, flank and chuck; thus making beef from cows and bulls an increasingly important part of the consumer beef supply. However, the population of cull cows marketed through auction markets and to slaughter facilities can be highly variable in body condition, health, hide color, and breed or type (NCBA, 2007; Ahola et al., 2011). As producers begin to think of cull cows as more than just an afterthought, opportunities to increase the value of these animals through management strategies, feeding, and the use of growth promoting technologies become evident.

Marketing Classes for Cull Cows

Carcasses from cows over 42 months of age are no longer eligible for the USDA Quality Grades of Prime, Choice, Select, and Standard as these quality grades are reserved for young beef (USDA, 1997). Thus, carcasses from animals that exceed 42 months of age are eligible for the USDA Quality Grades of Commercial, Utility, Cutter, and Canner (USDA, 1997). These carcasses are also eligible for USDA yield grades that estimate the cutability of a carcass (USDA, 1997). The beef packing industry rarely assesses cow carcasses for quality or yield grades unless it can find a market for these products. Therefore, USDA grades are not important in marketing beef from cull cows. Instead, the industry utilizes different terminology such as "Premium" and "Premium White," referring mostly to young cows with high-quality carcasses that have been fed a high concentrate diet (Peel and Doye, 2008). Cull cows are classified into four groups to determine their value and corresponding carcass merit (Peel and Doye, 2008). The four classifications are as follows (description from Peel and Doye, 2008):

- **Breakers (Breaking Utility)** are cows with a yield grade range of 2 to 4 and a 75 to 80 percent red meat yield. These carcasses are often processed into wholesale cuts.
- **Boners (Boning Utility)** are cows with an estimated red meat yield of 80 to 85 %. Carcasses are customarily boned for processing beef after the removal of merchandisable cuts.
- **Lean** refers to cows with an estimated red meat yield of 85 to 90 %, yielding at most a few merchandisable cuts with the majority of the carcass used for boneless processed beef.
- **Light** is the grade used for cows that may vary in estimated red meat yield from 75 to 90 % but always produce fewer pounds of boneless beef because the animal is small in overall size and weight, very light muscled, or extremely thin in condition.

Further differentiation within each class identifies low, average, or high dressing animals. These factors affect the cull cows' selling price at livestock auction markets (Peel and Doye, 2008).

Body Condition Score and Body Weight as Related to Cull Cow Carcasses

Body condition score (BCS), or muscling and external fatness, has a significant impact on the beef industry because of the effects on fertility and productivity (Richards et al., 1996). It is not uncommon for culled open cows to be in a low BCS. Body Condition Score is used to assess the animal and subsequent carcass value; thus cow condition is an important marketing component for the cattle producer to manage (Apple, 1999). From a beef processor's perspective, carcass value increases as BCS increases. However, the added labor costs and fat trim on overly fleshy cows (BCS 7 or greater) can diminish returns when subprimal cuts are removed and merchandised separately.

A cow BCS score of 6 maximizes the total sellable product (Apple et al., 1999), thereby maximizing carcass value (Apple, 1999). When calculated back

to a live value basis, higher BCS cows were more valuable to processors than thinner cows (BCS 2 – 5) (Apple, 1999.) This value to meat processors translates back to greater value to producers, as shown by premiums received for higher BCS and heavier cows at auction markets. From data collected on over 9,000 beef cows, cows with BCS 1 to 4 were discounted compared to BCS 5 cows, whereas premiums were received for cows estimated at BCS 6 to 8 (Aloha et al., 2011.)

The average selling price for beef cows in the survey timeframe was $45.15/cwt, with discounts ranging from $13.01/cwt (BCS 1) to $2.12/cwt (BCS 4). Premiums ranged from $1.65 to $1.97/cwt. Similar trends were seen based on body weight (B.W.). Compared to 1,200 to 1,400 lb. cows, light cows received significantly lower prices per cwt, and heavier cows received premiums (Ahola et al., 2011.)

Therefore, cow-calf producers should consider adding value to cull cows by feeding and management strategies that improve BCS and B.W. The optimal level of condition and weight depends on feedstuff availability and price, but the auction market and other marketing methods indicate readily available premiums for moderate and fleshy cows.

Feeding Cull Cows to Improve Body Condition Scores and Carcass Traits

A standard method to increase the BCS of cull cows is to feed them or place them on a high-energy diet. Feeding cows a high-energy diet is well known to increase BCS, external fat content, carcass fat content, marbling or intramuscular fat, lean carcass muscle, and meat tenderness, and also produce a whiter external fat color (Cranwell et al., 1996a; Schnell et al., 1997).

Many of these improvements to cull cow carcasses are beneficial to producers through higher sale prices and consumers as they result in higher quality meat with a more palatable eating experience. Additionally, the increase in white fat and marbling increases the value of the carcass and the packer's ability to market wholesale cuts into foodservice applications due to the higher quality and more palatable beef products. Grass-fed cattle often have a yellow external fat color due to compounds known as carotenoids in forages and stored in adipose tissue (Dunne et al., 2009). The primary pigment responsible for the yellow external fat color of grass-fed cattle is β-carotene (Dunne et al., 2009). Yellow fat is a concern in the beef industry as consumers perceive the product as undesirable, and consumers prefer beef with white fat color.

Feeding Considerations

While the potential exists to increase the cull cow's value through feeding, it may not be appropriate for every cull cow. Cows should be sound, healthy, and in thin to moderate condition. Cows that are unsound or injured should be marketed directly to a packer. Unhealthy cows provide obstacles to feed conversion, withdrawal times, and other management issues that need to be monitored and controlled. Additionally, cows in BCS 5 or 6 do not need to gain much weight and commonly have lower feed conversion rates compared to thinner counterparts.

Take care to ensure the cows are open. Substantial price differentials in the slaughter market exist between open and bred cows partially due to dressing percentage change. Pregnancies, especially longer-term pregnancies, decrease dressing percentage and yield less total product available for sale from that animal due to the fetus's weight and associated tissues.

Much like young cattle coming off of a high forage diet, cull cows should be introduced to a concentrate-based ration slowly so the rumen can adapt. Start the diet with approximately 50 Mcal NEg/cwt and make incremental increases over two to three weeks to reach a diet containing 60-63 Mcal NEg/cwt and 11.5% crude protein.

A variety of traditional or alternative feed products can be used in these diets (Table 2). Because the cows are not growing, gestating, or lactating, their requirements are relatively low. South Dakota State University research reported average daily gains of 2.81, 2.97, and 3.10 lb/day for cows fed for 50, 77, and 105 days, respectively (Pritchard and Berg, 1993). Other studies have observed gains of 4.63, 3.55, and 3.46 for cows fed for 90 days (Funston et al., 2003). Winter grazing of crop residues (corn stalks) with protein supplements to facilitate protein

digestion can produce reasonable daily gains at a low input cost.

Table 2. Example diets for feeding cull cows.

Item	Diet A	Diet B	Diet C
Corn	44.9	63.6	79.5
Corn silage	48.9	25.6	---
DDGS[a]	4.1	---	5.3
Alfalfa hay	---	8.3	---
Grass hay	---	---	12.3
Supplement[b]	2.1	2.5	3.0

[a] Dried distillers grain plus solubles.
[b] 40% crude protein with minerals, vitamins and an ionophore.

The general rule of thumb for gestating cows is one acre per cow per month. Cull cows may need more acres to provide more corn for a longer feeding period. These cows have the potential to gain 1.5 or more pounds per day. Over 2 months, that results in 90 pounds or more of gain and approximately one BCS.

Feed Additives and Growth Promoting Technology Use in Cull Cows

The feed efficiency of cull cows can be relatively poor, depending upon initial BCS, diet fed, and length of feeding period. When feeding cull cows high-grain diets, it is recommended to use ionophores to improve feed efficiency and reduce the risk of digestive problems. Both monensin (Rumensin®, Elanco Animal Health) and lasalocid (Bovatec®, Zoetis) are labeled for use in cull cows being fed for slaughter. It is possible to achieve similar responses in cows that are not going to be sold. However, note that monensin can be fed to bred cows remaining in the herd, but lasalocid is only approved for use in animals intended for slaughter.

Growth promoting technologies are commonly used in the U.S. beef industry to increase weight gain, improve efficiency of growth, increase lean beef production, and decrease the cost of beef production (NAHMS, 2000).

The two types of growth promotants currently available to producers are steroidal implants and beta-adrenergic agonists.

Implants are steroidal hormone-based growth promotants administered by placing the implant in the ear of cattle. Beta-adrenergic agonists are growth promotants fed to cattle the last 20-42 days in the feedlot. They increase growth by decreasing protein breakdown and increasing protein synthesis, resulting in increased muscle mass (Johnson et al., 2013). The use of growth promotants in cull cows can be an effective method to increase gains and carcass size, but it is imperative to select the proper growth promotant.

The most effective growth-promoting technology in cull cows seems to be implants (Cranwell et al, 1996a; Woerner, 2010). However, responses are likely dependent upon the type of implant used. Two primary types of implants have been used in cull cow research experiments:

- Estrogenic and
- Combinations of androgenic and estrogenic implants.

Estrogenic implants labeled for use in cows (Synovex-H® and Component E-H®) include a combination of 200mg testosterone and 20 mg estradiol benzoate. Combination implants used most often in cull cows contain 200 mg TBA (Revalor-200, Component TE-200, and Synovex Plus).

Cranwell et al. (1996b) demonstrated implanted cull cows have increased live weights, average daily gains, and improved feed to gain ratios based on work that used an androgenic implant (200 mg TBA), an estrogenic implant (200 mg testosterone + 20 mg estradiol benzoate), and a combination of the two implants.

Additionally, implanted cull cows produced heavier carcasses with larger ribeye areas and increased lean muscle content (Cranwell et al., 1996a).

Funston et al. (2003) evaluated the effect of a combination implant (200 mg TBA and 28 mg estradiol benzoate) on cull cow performance and carcass characteristics. They found implanting resulted in improved average daily gain, final weight, hot carcass weight, ribeye area, and yield grade. Earlier work with TBA implants in cows resulted in improved feedlot performance, carcass

weight, ribeye area, and yield grade (Garnsworthy et al., 1986; Pritchard and Berg, 1993). In contrast, some early research found implanting cull cows with testosterone either with (Spire et al., 1998) or without (Faulkner et al., 1989; Matulis et al.,1987) melengestrol acetate (MGA) did not improve animal performance or carcass characteristics.

However, most scientific literature shows improvements in one or more of the economic interest traits when implants are used with cows in the feedlot. It is important to note that if cull cows are going to be implanted, these animals must be fed a high-energy diet to meet the needs of increased muscle growth and fully realize the implant's benefit (Cranwell et al., 1996a; Woerner, 2010).

There are currently two beta-adrenergic agonist approved for use in the United States, ractopamine hydrochloride (Optaflexx®, Elanco Animal Health; Actogain 45, Zoetis) and zilpaterol hydrochloride (Zilmax®, Merck Animal Health).

In 2013, Merck Animal Health voluntarily halted sales of Zilmax®, pending the outcome of a review into any potential animal welfare effects from feeding the product to cattle. At the time of publication of this document, Zilmax® had not returned to the market.

The use of beta-adrenergic agonists in cull cows has been examined but does not always provide the same response as seen in feedlot cattle when fed at the same dosages. When cull cows were placed on a high-energy diet and supplemented with either 200 (Weber et al., 2012) or 300 (Allen et al., 2009) mg per head per day of ractopamine, , neither live weight nor hot carcass weight increased. However, feeding 400 mg per head per day of ractopamine to cows increased ADG and feed efficiency by 13.7 and 15.5%, respectively, on a live weight basis, and 16.9 and 20% on a carcass gain basis (DeClerck et al., 2020).

These authors concluded that cull cows may need to be fed increased dosages of ractopamine to match responses typically seen in feedlot heifers. Marketing method plays a role in economic return to feeding ractopamine, as researchers in the latter study calculated a 3X greater return to feeding a beta-agonist when cows were marketed on a carcass basis compared to selling on live weight.

Additionally, Niell et al. (2009) showed increased sellable product from the chuck and the largest ribeye areas in cull cows administered an implant in conjunction with being fed zilpaterol hydrochloride. Thus, there could be potential to use implants in tandem with beta-adrenergic agonists to increase growth and meat yields from cull cows fed a high-energy diet (Niell et al., 2009).

Other Economic Considerations When Feeding Cows

Feed costs are the highest costs to consider in the cull cow enterprise budget, but yardage and transportation also need to be considered. Yardage fees for a cow are higher than a steer or heifer rate (usually more than $0.50 per head per day) as the bunk space required per cow is 20-24 inches instead of the 9-12 inches commonly used for feeder cattle. Furthermore, cows typically deposit more manure in the pen, increasing the cost of pen maintenance and manure removal.

Transportation considerations include that a triple axle trailer (56,000 lb maximum load) can carry 40 cows at 1,400 lb or 35 cows at 1,600 lb. A partial budget template has been included as Appendix 1 at the end of this chapter to help calculate a breakeven selling price after feeding cull cows.

Additional Factors Affecting Value of Cull Cows

From the first non-fed beef quality audit in 1994 to the most recent in 2016, and, cow-calf producers and the industry have shown marked improvement in reducing condemned carcasses, lame animals, bruising, injection-site lesions, and the overall condition of cows sent to slaughter (NCBA, 2016.) However, areas for improvement that require relatively simple management changes still exist.

Adherence to Beef Quality Assurance Principles

A disconcerting find of the 2007 audit was that incidence of visible knots (most likely from intramuscular injection sites) in the shoulder area of beef cows, at 2.1% of carcasses, was higher than in previous years and was higher than the incidence

of knots in the neck. While in the 2016 audit, all carcass areas had lesser frequencies of visible knots compared to previous audits (NCBA, 2017). Auction market data (Ahola et al., 2011) showed no discount was given on beef cows with visible knots, but discounts were evident for dairy cows with visible knots.

Many injection sites do not leave a knot visible on the live animal but may still leave blemishes or lesions in the meat that become evident when the meat is further processed.

Over 20 years after implementing Beef Quality Assurance (BQA) programs, over 9% of top sirloins and 33% of bottom rounds showed major or minor injection site lesions (NCBA, 2007). In 2017, additional investigation using the slice audit procedure of the round was done and showed the the frequency of injection-site lesions had decreased by 13% and 20% in beef-type and dairy-type carcasses, respectively, compared to the 2000 injection-site audit (NCBA, 2017). The bottom round corresponds to the outside of the hind leg of the live animal. The presence of active lesions, calluses, and fibrous scars indicates BQA guidelines were not followed, and continued improvement is needed in this area.

Regardless of whether discounts have recently been applied at the auction market, the presence of injection-site lesions in any location decreases carcass value, negatively affects consumer confidence and is ultimately a loss to the industry. Adherence to BQA guidelines of injection location and hygiene reduces the incidence of knots and lesions.

Lameness

Sixteen percent of beef cows had visible signs of lameness in the 2007 audit, with 4% considered very disabled, though still able to walk (NCBA, 2007). Beef cows showed improvement by another 3.3% in the 2016 audit to bring the frequency of cattle walking normal to 87% (NCBA, 2017). Lame beef cows were discounted at the auction barn. The severity of the discount corresponding to lameness severity. Lameness indicated by a hunched back only when walking or when walking or standing were discounted $1 to $2/cwt, those which also favored a limb had a much higher average discount of $8.55/cwt, and cows that had great difficulty walking received a major discount of nearly $15/cwt (Ahola et al., 2011.)

Bruising

The percentage of cow carcasses trimmed for bruising has decreased but remains an area for improvement. The 2007 audit found that approximately 35% of cow carcasses required some level of trimming due to bruises which was an improvement from 1994 and 1999 audits (NCBA, 2007). The 2016 audit showed continued improvement from 2007 in the number of cow carcasses without bruises (35.9% vs 36.6%) and the number of carcasses that had extreme bruising (1.4% vs 5.4%) where an entire primal is removed (NCBA, 2017). The primary location of the greatest percentage of reported bruises in cows were on the round or sirloin (NCBA, 2017). Despite continued improvement in bruising, the lost opportunity from bruises for cull cows and bulls is $3.41 (NCBA, 2017). Many factors can contribute to bruising, but some simple management changes, such as providing training on low-stress handling, minimizing the use of prods and whips, selecting against temperamental cattle, and avoiding overcrowding, can reduce the incidence of bruising (NCBA, 2007).

Non-ambulatory or "Downers"

Since 2004, non-ambulatory or "downers" have been banned from slaughter for human consumption, per USDA Food Safety and Inspection Service (FSIS) regulations. Food Safety and Inspection Service rules state that any animal that cannot rise from a recumbent position or unable to walk is not eligible for slaughter and must be condemned. Thus producers must manage old, thin, or injured cows in a manner that does not allow them to deteriorate to a condition that prevents them from rising under their own power or becoming severely lame where they will become non-ambulatory during the riggers of transport. Animals that have reached this point and are not responding to treatment should be humanely euthanized.

Summary

Cull cows can provide a substantial source of income to the operation if managed correctly. Furthermore, cull cows are an important part of the beef industry

and account for a significant amount of the beef produced in the United States. Thus, producers need to keep in mind that cull cows are not only animals that have been removed from the herd due to loss of productivity but are significant in the beef supply chain. Minimizing the potential of carcass defects and monitoring animal health measures prior to selling cull cows can lead to added value instead of lost opportunities in quality issues.

Due to the seasonality of the slaughter cow market, there is the potential to increase profitability by timing the sales during peak early spring and summer months.

Producers can increase cull cows' value if they are in good condition and healthy and managed appropriately. Many carcass quality defects are manageable problems and preventable, also increasing value. Consider implementing strategies such as feeding a high-energy diet or supplementing cull cows' energy to ensure cows are in good condition, and optivize carcass value.

Producers can also utilize growth-promoting technologies to increase live weight, carcass weight, and red meat yield of cull cow carcasses.

Compared to the slaughter cow market, adding weight to cows may not be profitable during periods of high feed prices. Complete an enterprise budget to determine profitability.

Appendix 1: Partial budget template for comparison of cull cow marketing alternatives.

Days on feed	A. _____
Estimated average daily gain (lb/day)	B. _____
Total gain (A + B)	C. _____
Estimated cost of gain ($/lb)	D. _____
Cow weight prior to going on feed (lb)	E. _____
Estimated cow price prior to going on feed ($/lb)	F. _____
Estimated selling price after feeding ($/lb)	G. _____
Initial cost (E x F)	H. _____
Estimated total cost of gain (C x D)	I. _____
Combined total cost after feeding (H + I)	J. _____
Projected final weight (C + E)	K. _____
Projected breakeven price (J ÷ K)	L. _____
Projected return to feeding ((G x K) – J)	M. _____

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