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CORN GLUTEN FEED OR CORN DISTILLERS - WHICH SHOULD I FEED?

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Corn co-products such as corn distillers with solubles (DGS) from ethanol production, or corn gluten feed (GCF), have both been shown through extensive research to be highly digestible alternative sources of protein, energy and phosphorus (see Table 1). They can optimize performance and reduce feed costs when incorporated into beef growing and finishing rations.

The most common question asked is: "One person is saying that I should be feeding corn distillers while another is saying I should use corn gluten feed. When I compare the two products for relative value, on an energy and protein basis, they seem similar – which one is best for growing (backgrounding) and which is best for finishing – or are they the same?"



Figure 1: Feedlot cattle can utilize corn processing co-products effectively

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Both are co-products of corn processing, so there are a number of similarities. However, because they are from two different systems there are some nutrient differences which are important considerations in their evaluation.

Corn gluten feed is a co-product of the wet corn milling industry that extracts the starch from corn, which is then further processed to make fructose, or fermented to produce ethanol. Corn distillers (ethanol) on the other hand is a co-product of the dry milling industry that focuses on converting the starch from the corn to sugar which is then fermented to produce ethanol.

Both are good sources of protein, energy and phosphorus for beef cattle. Both contain low levels of starch. Much of the benefit of these co-products is the fact that their energy content comes from the highly digestible residual fibre content. This fibre component is beneficial in reducing acidosis in high grain rations and also aids in fibre digestion when fed in high forage rations. Both are available in dried (DDGS and DCGF) or wet form (WDGS and WCGF). The wet products offer some performance advantages but with potential transportation and storage challenges that can limit their use.

Table 1. Typical Analyses of Corn Co-Products (dm basis)

	Dry Corn Gluten Feed	Dried Distillers Grains w/ Solubles	Wet Corn Gluten Feed	Wet Distillers Grains
Dry Matter	90	90	40	30-35
Protein	23.40	27.80-30.40	23.40	30-32
Fat	2.80	8.90-10.70	2.00	8.50-12.50
NDF	12.40	44-46	38.00	30-50
TDN	82	85-90	82	70-110
NE g (Mcal/kg)	1.30	1.50	1.30	1.54-1.76
Calcium	0.10	0.17-0.26	0.10	0.20-0.30
Phosphorus	1.10	0.78-0.83	0.90	0.50-0.80
Sulfur	0.33	0.30-0.63	0.40	0.50-0.70

However, the distillers co-products have higher energy levels (largely from higher oil or fat content) and higher protein levels, making them more nutrient dense than gluten feed (CGF). As well, the protein in the distillers has a higher percentage (55-60%) of escape or bypass protein (UIP, undegradable intake protein) than the corn gluten feed, which has only 20-22% UIP, and correspondingly higher levels (78-80%) of soluble protein (DIP, degradable intake protein).

So, which is best for growing cattle and which is best for finishing? Or are they the same? Unfortunately, based on information from many research trials there is not be a straight forward easy answer. Beef producers who have fed these co-products for a number of years probably have a personal favourite. However, based on research and scientific theory I have some recommendations.

Growing /Backgrounding

For growing or backgrounding rations my preference would be the corn gluten feed. Much of the research indicates better animal performance using CGF in higher roughage feeding programs than in high grain or concentrate diets. According to researchers at Kansas State University, “The energy value of corn gluten feed relative to corn increases in high roughage diets. It supplies additional energy without the negative associative effects on fibre that can occur when high levels of grain are fed. By not retarding fibre digestion, CGF increases total digestibility of these high roughage diets, thereby increasing cattle performance.”

CGF’s lower protein levels , low fat and low starch content make it a compatible alternative that can be fed at relatively high inclusion rates, effectively providing the required protein as well as replacing a large portion of the grain in growing diets. However, to optimize animal performance by balancing the UIP/DIP protein fractions, another source of UIP may need to be supplemented due to the lower levels in the protein fraction of GCF.

On the other hand, it could be said that distillers grains, with the higher levels of UIP would do a better job in providing the type of protein necessary for growing /backgrounding cattle. Also, because DGS are more nutrient dense, lower inclusion rates may be an advantage depending on the supply of other, possibly home grown ingredients.

Table 2. Performance Results of an 84 Steer Trial

Cattle Performance	Ration Supplement Type* and % of Diet			
	SBM* (7.8%) Of DMI	DCGF (34.9%) Of DMI	WCGF (34.9%) Of DMI	DDGS (17.4%) Of DMI
Initial Wt., kg	274	275	276	273
Final Wt., kg	394	422	418	426
Daily Gain , kg	1.24	1.52	1.46	1.57
Daily Feed, kg	9.61	10.42	9.52	8.99
Feed/gain	7.73	6.86	6.52	5.71
Diet Protein %	11.4	11.2	11.9	11.8

Firkins et al

*SBM = soybean meal, DCGF = dried corn gluten feed, WCGF = wet corn gluten feed, DDGS = dried distillers grains with solubles

Finishing

In the finishing stage, we are usually trying to maximize energy intake, so my preference would be to use the distillers. By using the corn distillers to provide the necessary protein requirements we can also give the ration a bit of energy boost (higher oil content in the distillers). But, as pointed out, the DGS have 55-60% UIP. Finishing cattle need a greater amount of DIP than UIP. In finishing rations where DIP levels are not being met when including distillers, some urea may need to be included.

On the other hand, field trials at the University of Nebraska with Scott and others demonstrated that when WCGF was included in finishing rations (regardless of the type of grain processing) cattle gained 6% faster than steers fed diets that did not include WCGF. Steers fed SFC (steam flaked corn) plus WCGF gained 8% faster and steers fed SFC or SFC + WCGF gained 10% more efficiently than all other treatment groups.

Table 3. Evaluation of Wet Corn Gluten Feed and Dry Corn Gluten Feed in Diets for Growing and Finishing Beef Cattle

Reference	Form of CGF	% of Corn DM Re-placed	Diet	Average Daily Gain lb	Change from Control %	Feed: Gain	Change from Control %
Green et al. (1987)	Wet	23	Finishing	3.23	+3.5	6.2	3.1
Green et al. (1987)	Dry	23	Finishing	3.04	-4.3	6.1	-1
Ham et al. (1995)	Wet	100	Growing	2.62	+16.0	6.9	+13.3
Ham et al. (1995)	Wet	40	Finishing	3.74	+8.3	6.4	+3.3
Firkins et al. (1985)	Wet	54	Finishing	3.04	+3.8	6.4	-3.9
Firkins et al. (1985)	Dry	54	Finishing	2.97	+1.5	7.0	-14.4
Richards et al. (1998)	Wet	50	Finishing	3.76	+9.6	6.3	+12.0
Sindt et al. (2000)	Wet	30	Finishing	3.22	+2.5	6.0	+1.8
Trenkle (1987a)	Wet	56	Finishing	3.09	-4.0	6.4	0.0
Trenkle (1987a)	Dry	56	Finishing	3.13	-2.2	6.9	-8.9

Processing Considerations

Researchers have looked at cattle performance when the dietary corn was processed with different methods and then fed in combination with corn distillers grains or with corn gluten feed. Results are shown in Tables 4, 5 and 6.

Table 4. Effect of Corn Processing With Calves Fed 32% Wet Corn Gluten Feed

Cattle Performance	Processing Method*				
	Whole	DRC	FGC	RHMC	SFC
ADG, lb	4.18	4.24	4.17	4.15	4.25
Feed:gain ratio, DM	5.92	5.52	5.32	5.26	5.18

(Macken et al., 2006).

*DRC = dry rolled corn, FGC = fine ground corn, FRC = fine rolled corn, RHMC = rolled high moisture corn, GHMC = ground high moisture corn, SFC = steam flaked corn, whole = whole corn

Table 5. Effect of Corn Processing With Yearlings Fed 22% Wet Corn Gluten Feed

Cattle Performance	Processing Method*			
	DRC	FRC	RHMC	SFC
ADG, lb	3.98	3.95	4.02	4.22
Feed: gain ratio, DM	6.09	6.15	5.97	5.54

(Scott et al., 2003)

*DRC = dry rolled corn, FGC = fine ground corn, FRC = fine rolled corn, RHMC = rolled high moisture corn, GHMC = ground high moisture corn, SFC = steam flaked corn, whole = whole corn

Table 6. Effect of Corn Processing With Cattle Fed 30% Wet Distillers Grains With Solubles

	Processing Method					
	Whole	DRC	DR/HM	HMC	SFC	FGC
DMI, lb/	23.10	22.60	21.50	21.00	20.40	20.40
ADG	3.85	4.05	3.91	3.89	3.59	3.38
F:G	6.07	5.68	5.61	5.46	5.76	6.15

Vander Pol et al., 2006

DRC = dry rolled corn, FGC = fine ground corn, HMC = high moisture corn, SFC = steam flaked corn, whole = whole corn

Table 7. Effect on Cattle Performance of Dietary Level of Dried Distillers Grains With Solubles

Item	Percent of Dried Distillers Grains With Solubles in Diet				
	0	10	20	30	40
Dry matter intake, lb	20.80	21.80	20.80	21.20	20.70
Average daily gain, lb	3.29	3.55	3.71	3.56	3.56
Final body weight, lb	1230	1266	1297	1273	1258
Feed/gain	6.32	6.15	5.60	5.93	5.77
University of Nebraska					

While it is important to point out that these trials incorporated the wet co-products, the results do illustrate that there can be performance differences dependant on the type of processing used with the corn portion of the ration. One could conclude that WCGF works best in combination with steam flaked corn, while the WDGS may work best with dry rolled or high moisture corn.

Inclusion Rates

Considerable attention has been directed toward maximum and optimal inclusion rates of these co-products. The low starch and high fibre levels of these co-products lend themselves to potentially high inclusion rates, but their medium protein levels, relatively high phosphorus and sulphur content do set some limits from an environmental and animal health perspective.

Recent work out of Nebraska is now suggesting optimum inclusion rates of 20% of the ration for dried distillers with solubles, summarized in Table 7.

Other conclusions from researchers suggest wet corn gluten feed is more digestible than dry corn gluten feed and can replace up to 50% of the dry rolled corn, or 30% of the steam flaked corn in finishing rations without negatively affecting performance. Dry CGF can replace up to 25% of dry rolled corn in beef finishing rations before reductions in cattle performance begin to occur.

If you are still unsure as to which to use there is research that demonstrates benefits to feeding a combination of both corn distillers and corn gluten feed.

Combinations

If you are still unsure as to which to use there is research that demonstrates benefits to feeding a combination of both corn distillers and corn gluten feed. Researchers at the University of Nebraska conclude that diets containing

30% of both WCGF and WDGS improved performance compared to cattle fed no co-products. Optimum ADG and F:G were achieved with inclusion levels of WDGS ranging from 15 to 20% in diets that also contain 30% WCGF.

The bottom line seems to be that both of these corn co-products are good alternative feed ingredients that can improve performance and potentially save money on feed costs. In the process of evaluating these co-products it is important to recognize, understand and account for the nutrient differences between corn distillers and corn gluten feed, both from the standpoint of balancing a ration and making purchasing decisions. If you use a balanced approach to decision making you will probably be satisfied with the performance of the combination of these co-product feeds that you choose.

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AGE VERIFICATION, NOT JUST FOR CALVES ANYMORE!

Value Adding through Age Verification can make you money on more than your calves! Things are tight and everyone is looking for ways to cut costs or generate more income, including age verification. It helps in calf sales even if you don't seem to see a premium. It may generate another bidder or two on your calves and therein lies your advantage.

That extra bidder can work for you in another area - with your cull cows. "Why would I age verify a cull cow" you ask? Because Rule Two re: export of cattle over 30 months of age to the United States came into effect on Nov.19/2007. It states that cattle over 30 months, but born after March 1/1999 can be exported to the United States for slaughter, with all the appropriate checks by the certifying Veterinarian. Thus, if you can prove the age of the cow with age verification, more bidders maybe interested in her in the meat ring.

If you raised the cow, enter her birth date or year into the CCIA data base. They will accept birth dates for cattle up to 10 years old. If you aren't comfortable with putting the data in yourself, speak with Dan Ferguson or some of OCA's new data input folks to get the birthdates entered. Remember to allow some turn around time on this.

Once the cow's birth date is entered you can print off a birth certificate to send with the cow to the auction mart, as well as letting the auction know what you have and are sending. Most auctions are checking cows the day before the sale and marking those that have export potential.

Some auctions suggest it may bring a price difference of +\$0.05 to +\$0.15/lb. So \$0.10/lb on a 1500 lb cow = \$150.00. That might be worth investing a little time in trying to obtain.

Most auctions are checking cows the day before the sale and marking those that have export potential.

One auction noted to me that "the ear tag number and the paper have to match". That would seem pretty basic but obviously some folks are sending cattle and paper work that don't match.

So...

check your tags

do some age verification on your potential culls
work with your auction mart

Hopefully this will generate a little *Value Added* on the final income some of those cows will generate for you.

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PASTURE MANAGEMENT TIPS FOR THE COMING SEASON

A well managed pasture will provide the lowest cost feed source for beef cows. Forage that is grazed at the optimum time will provide your livestock with high quality feed throughout the growing season. With pasture there are no harvest costs, no storage costs and no feeding costs other than some fence and a water system, both of which will last for years. Another advantage of a pasture system is that there is no bedding requirement and no manure to spread.

Frost seeding is an effective way to increase the legume content in your pasture. Applying trefoil or white clover seed during March will increase the legume content of the pasture. This has two benefits: 1. the legumes will provide nitrogen to promote grass growth, and 2. legumes hold their feed quality better than grass species, resulting in higher quality feed value in the pasture. Broadcasting

trefoil at 1-3 pounds per acre or white clover at 1 pound per acre should give a reasonable stand of new plants. Frost seeding is not fool proof; if there is strong grass competition the seedlings will struggle to survive. Choose fields that were grazed short last fall.

How early in the spring you start cattle grazing a pasture has a big influence on how productive that pasture will be throughout the season. If the plants are bitten off before the second leaf has emerged, their root reserves will be diminished and future growth will be slow. An expression that is used by some pasture managers is "a day in the spring is worth 3 in the fall", meaning that for every day you hold off grazing in the spring you will be able to get 3 extra days of grazing in the fall. By allowing the forage plants to get a good start at the beginning of the season

they will be more productive throughout the year.

The pasture is a solar panel catching the energy from sunlight and turning it into plant growth. Any bare soil areas are like holes in a solar panel. These exposed areas have

Several negative impacts: the opportunity to grow forage has been missed, the soil is exposed and dries out much quicker and also heats up much more. The loss of moisture through evaporation diminishes the moisture available for plant growth. The cool season plants that are common in Ontario pastures do not grow well if soil temperatures are too high, so the higher temperature of bare soil has an overall negative impact on growth.



Figure 1. Pasture provides nutritious, low cost feed for cows and calves.

To minimize the soil evaporation loss keep the grass at a healthy growing height. In most cases this is at least 3-4

inches (7.5-10 cm) high. This will leave enough plant area for fast recovery. Plants start to re-grow about 5 days after being grazed, and if this new growth is consumed the plants' reserves are diminished and growth will be slow and not very productive.

A rotational system that has the livestock moving at least every 5 days to new pasture will be the most productive. Increasing this to daily moves will provide further benefits in both grass growth and forage intake by livestock.

Three keys to developing strong, productive pastures:

- 1. Frost seed trefoil or white clover during March***
- 2. Start grazing after the 2nd leaf has emerged on established plants***
- 3. Move livestock to new growth every day***

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CRIMINALS STALK YOUR BARNYARD - WHAT CAN YOU DO ABOUT IT?

Criminals thrive on opportunity. Crime Stoppers, Neighbourhood Watch, and police forces all agree that citizens have to take steps to protect themselves. Lock your car, stowing valuables out of sight. Take the key out of your snowmobile, and secure it with a chain and padlock for the night. Install motion detecting lighting outside the garage. All good advice ... and when something valuable goes missing, the first questions asked usually involve the security procedures which were employed to protect the valuables. In today's society, it almost seems that honest citizens are held as accountable for theft of their property as those who steal it!

Substitute "farmer" for honest citizen, and barn yard for residence and personal property. Who are the criminals in this scenario? They walk on four legs and masquerade as harmless domestic animals. Beef cows! Each one should be wearing a bandana across its muzzle and a hat pulled

low over its eyes. Every day across Canada, millions of cows commit the criminal act of stealing valuable feed!

There's no denying that feed is valuable, whether you grow it yourself or buy it in. And with feed representing 60-70% of the cost of production in a cow-calf enterprise, even a small amount of pilfering by your cows can add up to big dollars. Yes, cows steal your feed, but don't get mad at them ... it's not their fault. No, I don't mean a difficult calthood; I'm referring to their evolutionary background. Cows are grazing animals. They are supposed to spend their lives outdoors, contently grazing on grass and similar plants which are rooted in the soil. They are superbly equipped to grasp stalks with their tongues, rip them off against the hard upper palate, and work them through the grinding action of molars before swallowing the resulting shredded mat. If you watch cows grazing, you will see little evidence of waste. Most of the forage harvested ends up in

the rumen. While some standing feed is wasted by trampling and dunging, this is minimal if grazing activity is properly controlled.

However, we now routinely raise beef cattle in Canada in areas where snow depth or tradition prevent grazing during winter, making stored feed a necessity. The most common method of preserving feed for beef cows is large round bales of long stem forage. While this technology is great for saving time and reducing manual labour, it can present major problems at feeding time. Cows are not designed to eat pre-cut, long stem forage tightly packed into bales. While they are adaptable creatures, and quickly learn to extract hay from the bale in a feeder or sitting on the ground, they are not replicating normal grazing action. This causes them to slip into a life of unintentional feed thievery, wasting potentially huge amounts of valuable forage. As they extract stems out of the bale, extra forage is also pulled out and falls to the ground, where it is quickly trampled into oblivion. And we can't discount the ability of cows to sort their feed. They prefer leaves to stems, less mature stems over woody stalks. If given the opportunity, they will select the more palatable feed and leave behind the coarser material. These combine to create the mound that builds up under and around bale feeders over the winter. Your carefully fertilized, cut, baled and transported feed has become a cushion for cows.

How much feed is wasted? Experience as well as research has shown that cows can waste over 40% of the feed placed in a poor round bale feeding system. This is incredible! Just think of the excitement which would greet an announcement by geneticists that they have bred cattle which were 40% more feed efficient than conventional cattle. On many farms, significant improvement in feed efficiency is possible, simply by changing the feeding strategy and types of feeders.

The worst feeding strategy is to feed whole round bales once per week, on the ground, without unrolling or placing them in any feeder structure. Cattle trampling is uncontrolled, with the feed source rapidly becoming unrecognizable as dominant cows fill up and then claim the pile as their lie down area. This can waste over 40% of the feed offered (see Table 1). Just think ... out of every 10 bales you harvested, 4 were wasted.

Round bale unrollers have become more popular, allowing the producer to spread the hay out in a long mat, giving all of the cows access to feed at the same time. But timing has as much to do with making unrolling work as the PTO on the tractor. Unrolling enough feed to last a week at a time can still allow a wastage level in the 40% range. When the number of bales unrolled just matches the daily intake of the cows, feed wastage can be reduced to the range of 10 to

12%. In this situation, cattle are actively competing for every mouthful, clustering around the hay as it is rolled out. While this is an improvement, 1 in 10 harvested bales is still lost.

What about steel round bale feeders? Compared with putting out a week's worth of free standing or unrolled bales, feeders filled on a once per week basis reduce wastage by up to 80%. They are certainly worth the investment if feeding is only a weekend chore! There are many different types of feeders on the market. Researchers at Michigan State University compared various types of round bale feeders¹. Ring type feeders, with slanted bars, were very effective at limiting waste (see Table 2). This included standard round feeders as well as those with a second row of inward slanting bars which provided a cone-shaped support to the bale. With these types of feeders, cattle wasted only an average of 4.5% of the feed offered. Note that these feeders had slanted rather than vertical bars on the sides. Trailer type feeders, consisting of a wheeled rectangular base with an array of bars around the perimeter, were evaluated as having 11.4% wastage. In comparison, cradle type feeders, which had a rectangular base outfitted with trays and a v-shaped bale holder allowed 14.6% feed wastage.

The cradle type feeders had vertical side bars, which have been shown in the past to be a poor design for controlling wastage in conventional circular feeders. With vertical bars, cattle tend to pull mouthfuls of feed straight back from the bale, with residue spilling out and on to the ground. Slant bars make cattle work a little harder, and they tend to leave their heads in the feeder longer, limiting spillage.



Figure 1: Feed thieves caught in the act

Next time you check the cows, take a good look around the feeding site. Do you see evidence of excessive feed wastage? Don't contribute to cattle delinquency by making it easy for them to steal your feed.

Table 1. Feed Wastage With Round Bale Systems, % of Hay Offered

Feeding Schedule	Feeding System	
	Whole bales on ground	Unrolled bales on ground
Weekly	>40%	40%
Daily	N/A	12%

Table 2. Feed Wastage With Round Bale Feeder Systems, % of Hay Offered

	Feeder Type			
	Ring feeder, slanted side bars	Ring feeder, slanted side bars plus interior cone	Trailer type	Cradle type
Feed Wastage	3.5%	6.1%	11.4%	14.6%

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