Ridin' Herd

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Distillers' grains for heifer development

Heifer development programs can be a major expense for the cow-calf enterprise. Heifer development costs depend on when the potential replacements are weaned and on the feeding strategy used to develop the heifers. Because the replacement heifer enterprise does not generate income, or very little income from cull replacements, costs for this enterprise are borne by the cow-calf enterprise.

Distillers' grains increase return potential

Our data suggest replacement heifer costs can add $69 to $88 to annual cow costs. These costs are incurred from the time the replacement heifer is weaned until the beginning of her first calving season. The more economical the replacement heifer program, the greater the profit potential of the cow-calf enterprise — as long as reproductive performance of the heifers is not compromised.

Byproducts from the production of ethanol are becoming more available to cow-calf producers. How these byproducts fit into a heifer development program has the potential to affect the bottom line.

There is limited data available on the use of distillers' grains in heifer development programs. Research trials already conducted indicate that distillers' grains are higher in energy than corn. Research also indicates there are no negative interactions on forage digestion when distillers' grains are included in high-forage diets. These findings make distillers' grains a prime candidate to use in a heifer development program.

Heifer development programs require quality feeds that allow for a targeted gain. Dried distillers' grains (DDG) are about 30% crude protein (CP) and are a good source of bypass protein. Of the 30% CP, 35% is degraded intake protein (DIP) used by the rumen microorganisms to make their own protein, and 65% is undegraded intake protein (UIP) or bypass protein. Heifers are still growing during the developmental phase and have a requirement for some bypass protein in the diet. This is another good reason why DDG should work in a heifer development program.

Table 1: Effect of distillers' grains supplementation fed to developing replacement heifers on reproductive performance

Item	CON	DDG	SEM	P-Value
Pubertal prior to PGF, %	77.7	86.1	1.3	0.44
Age at puberty, days	332	340	6.0	0.23
Weight at puberty, lb.	677	704	11.0	0.03
Estrus response, %	75.8	75.9	4.1	0.98
Time of estrus post PGF, hour	68.0	64.8	1.2	0.19
AI conception rate, %	52.9	75.0	6.3	0.001
AI pregnancy rate, %	40.1	57.0	4.0	0.003
Overall pregnancy rate, %	89.3	89.4	3.2	0.97

No treatment-by-location interactions — treatment main effects reported.

AI conception rate = portion of heifers in estrus after synchronization conceived to AI.

AI pregnancy rate = percentage of the total group of heifers that conceived AI.

Martin et al., *2007 Nebraska Beef Report.*

DDS and reproductive performance

The nutrient attributes of DDS in a heifer development program sound too good to be true; so, now for the potential concern.

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There are data that suggest diets supplying a lot of UIP can have a negative effect on reproductive performance. These data were generated using feedstuffs other than DDG that were high in bypass protein. One set of data indicates that diets high in UIP fed to replacement heifers increased weight at puberty in addition to increasing age at puberty. Another set of data indicated supplementing postpubertal heifers with diets high in UIP resulted in decreased serum concentrations of follicle stimulating hormone (FSH). These relationships are not good for a heifer development program.

We designed an experiment to examine the effect of high UIP in a heifer development program on reproductive performance. We used 316 crossbred heifers divided evenly into two groups, a treatment group and a control group. All heifers were treated alike, except the diet for the treatment heifers included DDG.

Because DDG have a high amount of UIP, treatment heifers had a much higher daily consumption of UIP compared to the control heifers. Minerals and vitamins were balanced in each diet. The remainder of the diets were grass hay that ranged between 8.4% and 11.0% CP and about 54% total digestible nutrients (TDN).

Heifers used in this experiment were born in the spring and weaned in the fall of the year. Heifers were weighed throughout the trial, and their diets were adjusted to achieve similar average daily gains (ADG). In addition, blood samples were collected throughout the experiment so we could determine when puberty occurred.

Heifers were synchronized for estrus using two shots of prostaglandin (PGF, trade name Prostamate®) given 14 days apart. For five days after the last shot of prostaglandin, the number of heifers responding to synchronization and the time (hours after the second PGF shot) heat occurred were recorded, and heifers that exhibited heat during the five-day time frame were artificially inseminated (AIed) using the same bull. We waited 10 days, then turned in cleanup bulls for a breeding season of 45 days total. Forty-five days after the AI period, heifers were ultrasound scanned for pregnancy to determine if pregnancy occurred during the AI period.

Table 1, page 58, illustrates the results of the experiment. The percent pubertal prior to PGF and age at puberty were not different between groups. Weight at puberty was different in favor of the DDG-fed heifers. The weight difference was due to a 0.24-pound (lb.) ADG difference in the second year.

Time to estrus after the second PGF injection was not different between groups. The AI conception rate, the percentage of heifers conceiving to AI following a detected heat after the second PGF injection, was significantly greater in the DDG-fed heifers. This corresponded to a greater AI pregnancy rate in the DDG-fed group.

Overall pregnancy rate, using a total 45-day breeding season, was not different between groups. These data clearly demonstrate that diets using DDG that may result in high bypass protein [average UIP intake 253 grams (g) per day, maximum UIP intake 351 g per day in our experiment] does not have a negative effect on reproductive performance in replacement heifer development programs.

The DDG were supplemented at 0.57% of heifer body weight on a dry-matter (DM) basis. Heifer weights and average body weight was determined throughout the experiment. If the average weight of the heifers was 700 lb., they were fed 4 lb. per head per day of DDG on a DM basis (4.5 lb. per head per day if the DDG were 90% DM).

If heifers are consuming 2.5% of their body weight on a DM basis daily, their total DM intake would be about 17.5 lb. per head per day. Of the 17.5 lb. per head per day intake, 4 lb. per head per day would be DDG. DDG at this level calculates to 23% [(4 lb. per head per day DDG ÷ 17.5 lb. per head per day intake) × 100 = 22.9%] of the diet on a DM basis. This amount of DDG is well within my recommendation for the inclusion of DDG in the diet, which is not feeding more than one-third of the diet on a DM basis as DDG.

As with any diet that is developed using DDG, because DDG are high in phosphorus, it is important to make sure the calcium-to-phosphorus ratio is within the range for growing cattle. In addition, make sure there is plenty of bunk space or eating space so that each animal gets its fair share.

Make sure the ration is mixed uniformly to avoid any complication with sulfur in the DDG.

Finally, total fat in the diet should not exceed 5% to eliminate the negative effect of fat on forage digestion in the rumen.

Final thoughts

As the ethanol industry expands in the United States, especially in the Great Plains, there will be a greater opportunity to feed distillers' grains in the wet or dried form. If DDG are priced economically, these data suggest they will fit into heifer development programs and reproductive performance will not be compromised. In these diets, DDG are an excellent energy source. In addition, other protein and phosphorus sources will not need to be supplemented.

Editor's Note: *"Ridin' Herd" is a monthly column written by Rick Rasby, professor of animal science at the University of Nebraska. The column focuses on beef nutrition and its effects on performance and profitability.*