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Effects of Supplemental Whole Cottonseed on Weaned Calf Production

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EFFECTS OF SUPPLEMENTAL WHOLE COTTONSEED ON WEANED CALF PRODUCTION

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By

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ABSTRACT

This study compared the effect of supplemental whole cottonseed in a weaned calf ration on cattle productivity. Feed is the main cost for livestock production. Whole cottonseed supplementation may increase production and reduce the cost of gain for the ration. During the study, 18 beef calves were weaned and split into two groups and fed, with and without WCS, for 50 days to determine the effect of supplemental whole cottonseed. Productivity was determined by measuring average daily gains for each group and comparing cost of gain for each ration. It was determined that WCS did increase productivity of weaned calves through showing a decrease in cost per pound of gain by $0.02 and increasing average daily gain by 0.36lbs.

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God Bless.

VITA

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INTRODUCTION

Beef production in the United States is heavily reliant on available feed resources characteristic to specific regions. While the United States grain belt has gained notoriety for the feedlot phase of production based on its close proximity to concentrate grain products, the southeastern United States has the highest concentration of cow-calf production farms. Given this information, the southeast is the main source of feedlot animals to be shipped westward to be finished and processed. Cow-calf operations rely heavily on the ability to increase gains in a cost-effective manner for weaned calves. Most producers wean calves and place them on feed for a minimum of 30 days before the calves are transferred to the stocker production phase.

To increase profits these cow-calf producers are constantly looking for feed by-products to decrease cost of gain while increasing pounds gained (Kunkle, 2001). By-product feeds have been introduced as an alternative to more expensive sources of protein, energy, and fiber. By-product feeds examples include whole cottonseed, distiller's grain, beet pulp and even potato peels. These products are a secondary material produced when crops are harvested, generally for human use.

Cottonseed can be efficiently utilized in cattle diets after weaning to increase average daily gain and decrease cost per pound of gain (Hill and Gates, 2003). The southeastern United States produces the majority of the cotton in the United States and for this reason the use of by-products from cotton production are relatively cheap throughout the region. Whole cotton seed provides both energy and protein (21% Crude Protein (CP), 17% Fat, and 24% Fiber) (Poore and Rogers, 1998). Research has

determined that cottonseed has a similar protein content as a soybean meal and corn mixture making it a more cost-effective source of protein for producers in the southeast (Bertrand, et al, 2005).

OBJECTIVE

Evaluation of the impact of cottonseed in the ration was calculated by determining cost of the base ration then the base ration plus the addition of the cottonseed. If the average daily gain (ADG) of the whole cottonseed supplemented pens (WCS) were significant enough to offset the increased cost, then the addition of cottonseed is economically beneficial in our scenario.

MATERIALS AND METHODS

Source of Animals

All cattle on trial consisted of Hereford/Angus crossbred calves. All cattle used were sourced from the Western Kentucky University Agriculture Farm breeding stock. Calves were weaned in October from the University Farm.

Weaned Calves' Growth Trial

During the first week of weaning calves were adjusted to the base ration consisting of cracked corn, fescue hay, and distillers soluble. Calves (n=18; Initial wt. 542.9, +/- 75.2 lb.) were stratified by initial body weight and assigned to one of four pens (n=2 per treatment). Control pens (CON) were provided the base ration comprised of 25% fescue grass hay, 52% corn distiller's soluble, and 23% cracked corn. Whole cottonseed supplemented pens (WCS) were provided the base ration with the addition of whole cottonseed via topdressing at 1% body weight. Calves in CON were assigned to pens 1 and 3. WCS calves were assigned to pens 2 and 4. The trial lasted a total of 50

days. Amount of ration provided was calculated to ensure a 2 pound ADG over the period of the trial. Groups were fed once every 2 days and refusals were measured before each feeding to ensure fresh feed was available. Readjustment of cottonseed occurred at the midpoint, day 25, in order to maintain feeding of 1% body weight of whole cottonseed to the WCS group. The average weight of animals at day 25 was 605lbs. Weights taken at day 25 along with refusal weight were also used to adjust the amount of feed provided to each group in order to minimize waste and ensure a ADG of 2 pounds.

Ration Composition

A ration is the daily feed portion prepared from various feed products to meet nutrient requirements for animals (NRC, 1984). The base ration was comprised of 25% fescue grass hay, 52% corn distiller's soluble, and 23% cracked corn balanced for crude protein and energy. The ration was formulated to ensure average daily gain (ADG) of 2.0lbs per day. Rations were recalculated at day 25 to ensure they maintained this goal ADG throughout the trial. After two feedings refusals were removed to ensure fresh feed was available at all times. These refusals were weighed and used to calculate the intake per group. Fescue hay was sourced from the WKU Agriculture Farm.

Feedlot Conditions

Each group was assigned equal sized paddocks of 125×25 ft. Each animal had a minimum of 2 feet of bunk space in order to ensure minimal bunk competition during feeding. Water was provided via free-choice waterers throughout the trial. The paddocks consisted of a concrete slab area around the feed bunks and watering system.

RESULTS

Statistical Analysis

Significance of these ADG values were calculated by using the Statistical Analysis System (SAS) programming. The relationship between treatments CON and WCS was determined using SAS programming. Treatment differences were considered to be significant at $P<0.10$.

Table 1.

Weight gain during growth trial

Treatment	ADGm (lbs.)	ADG (lbs.)	Total Gain (lbs.)
CON[a]	2.40	1.89[c]	94.3
WCS[b]	2.57	2.25[d]	112.3
SEM	0.15	0.20	7.27

[ab] CON and WCS represent the average between pens for each treatment

[cd] within a column, means without a common superscript differ $P<0.10$

Average daily gain at the midpoint (ADGm) shows ADG at day 25 of the trial. ADG shows total ADG at day 50. This shows significant difference at day 50 in ADG between the Control (CON) group and whole cottonseed supplemented (WCS) group as shown with the standard error of the mean at 0.2058. The difference between ADGm and ADG is expected since ADG slows as calf's increase in weight. Total gain between the two groups shows that WCS had greater gain than CON group (+18lbs). CON and WCS were calculated to have average daily gains of 1.89 and 2.25lbs respectively.

Table 2

Ration compositions and pricing

Ingredient	Pounds (lbs.)	Cost ($)
Distillers Solubles	400	255
Cracked Corn	180	500
Fescue Hay	195	195
Whole Cottonseed	75	172

[a] Fed to only WCS group

When evaluated, CON had a cost of $1.12 per pound of gain while WCS had a cost of $1.10 per pound of gain.

DISCUSSION

CON (94.30lbs) had a lower total gain when compared to WCS 112.30lbs group a difference of +18lbs of gain. In terms of ADG, the CON group had an ADG of 1.89 versus an ADG of 2.25 for the WCS group (+0.36lbs). Based on this analysis alone it can be determined that the WCS treatment can increase ADG at a significant level ($P<0.10$). However, if the cost to have increased ADG is too great then the producer will most likely choose whole cottonseed supplementation on their own operation (Kunkle 2001). After cost analysis it was determined that the WCS treatment had a lower cost per pound of gain (-$0.02). With this information this study shows that the WCS treatment may be more effective in both increasing ADG (+0.36lbs) as well as decreasing cost per pound of gain (-$0.02). Keeping the concentration of whole cottonseed between 0.33% and 15% in a ration has been shown to be the safe range of supplementation (Myer and Hersom 2003). However, considering the possibility of the gossypol toxicity with whole cottonseed, a lower percentage concentration was used in the trial.

CONCLUSION

Reducing cost of feed in beef production is a top priority for producers for many reasons, namely to increase profits. Through research of by-product feeds the producer can be well informed on what steps to take in order to make their operation more profitable.

In this trial beef calves were weaned in October and adjusted to a common weaning ration. Cost of ration was evaluated as well as overall ADG for both treatment groups. It was determined that the addition of whole cottonseed did in fact reduce the cost per pound of gain ($0.02) in that treatment. The use of whole cottonseed supplementation can help reduce the cost of production for producers thus increasing profitability of an operation when a cheap source of whole cottonseed is available. The study will be continued at Western Kentucky University to ensure statistical significance before a recommendation can be made to producers about the effectiveness of this ration composition.

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