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Broiler Litter as a Feed Supplement in Replacement Heifer Diets

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Introduction

The large number of poultry houses located in Mississippi could have a very positive effect on the state's beef cattle market. With approximately 5,000 poultry houses, Mississippi generates about 100 tons of poultry litter per house for a combined total of one billion pounds annually (Bagley, 1991). More than 90 percent of these are broiler houses that generate a waste product consisting of manure, sawdust or wood shavings, feed, and feathers that is suitable for use as a feed or fertilizer.

Broiler litter can be used by cattlemen as a fertilizer to increase forage quality and quantity. Used as livestock feed, it can decrease feeding cost during the winter months. Broiler litter could supply the feed requirements of 80 percent of the total beef cow herd in Mississippi if used over a 120-day wintering period.

As a fertilizer, land applications of broiler litter have been shown to significantly increase yields of pasture grasses such as tall fescue *(Festuca arundinacea)*, tall fescue-clover *(Trifolium spp.)*, and bermudagrass *(Cynodon dactylon)* (Huneycutt et al., 1988). Disposal of litter is often the primary reason for application to pastures, with crop fertilization considerations of secondary importance (Nichols et al., 1994). When disposal of broiler litter with excessive application rates takes priority over crop nutrient needs, both phytotoxic buildup of nutrients in the soil and the potential for nutrient runoff into water systems can become a serious environmental concern.

While broiler litter is valuable as a fertilizer, it has a greater economic potential as a feed source for beef cattle, provided the broiler litter is of sufficient quality to allow for adequate consumption (Fontenot, 1978).

Broiler litter is relatively inexpensive to purchase under current market conditions, with transportation normally the greatest cost concern. High quality broiler litter has approximately the nutrient equivalent of alfalfa hay, with feed-grade broiler litter often having a crude protein content of 25% and a TDN value of 60%.

As an energy source, broiler litter has 10 to 40% the feeding value of No. 2 corn and can replace 15 to 25% of the grain ration. As a protein supplement, it has 50 to 55% the value of soybean meal (41% crude protein), and may replace 25% of the oil meal supplement of a diet (Ensminger, 1977).

Broiler litter as a feed source for beef cattle is well-documented and researched (Bagley and Evans, 1995). Most data suggest that beef cattle fed a mixture of broiler litter and grain and/or silage will have similar to slightly lower weight gains than those of cattle fed diets of grain or silage alone, depending on the feed component and percentage being replaced by broiler litter. McCaskey et al. (1994) report gains of 2.53 pounds per day when steers were fed a concentrate diet, versus 2.12 pounds per day for steers fed a 50 percent broiler litter and 50 percent corn diet.

Using it as a livestock feed is an excellent method of disposal of excess broiler litter. Feeding to animals allows for enzymatic breakdown of nutrients inside the rumen, which alleviates the leaching and water quality problems associated with fertilizer use and land disposal.

Before a producer decides whether to use broiler litter as a supplemental feed, the following considerations should be factored into the management strategy:
(1) Public perception of consuming beef having been fed broiler litter.
(2) Processing of broiler litter to destroy bacteria.

A. *Deepstacking* -- Deepstacked broiler litter sheltered from moisture will go through a heating process. An internal temperature of 130� F is sufficient to kill *E. coli, Salmonella*, and other potentially harmful bacteria. Care not to exceed a 160� F internal temperature should be taken as this reduces feed quality (Rankins et al., 1993). Internal temperatures can often be controlled by covering and removing plastic sheeting to and from the litter stack. Ruffin and McCaskey (1991) reported that broiler litter should be placed under a barn and covered with plastic sheeting to protect the litter from rain and other elements and to control excessive internal heating in the stack.

B. *Foreign objects* -- Broiler litter can contain materials such as rocks, nails, glass, pieces of metal, and even hand tools. These foreign objects must be removed to prevent consumption by animals and potentially serious side effects such as "hardware disease" from occurring. Mixing the broiler litter diets through equipment with magnetic strips is helpful in removing metal objects.

(3) Quality of broiler litter.
A. *Moisture content* of broiler litter should range between 15 and 25% for ease of processing and prevention of molds.

B. *Ash content* in broiler litter is normally high because of the presence of wood chips and sawdust, which are frequently used as bedding materials. Samples analyzed for nutrient content that have an ash content between 15 and 25% are excellent for feeding purposes. If a sample shows the ash content above 28%, the broiler litter will be highly unpalatable because of soil and/or wood contamination and should be used as a fertilizer rather than a feed ingredient (Bagley and Evans, 1995).

C. *Broiler litter* is very high in both calcium and magnesium, but there are instances where cattle will show deficiency symptoms (grass tetany in magnesium deficiency and milk fever in calcium deficiency). Feeding a plain white salt supplement will normally increase mineral availability, but mineral imbalances may still occur.

If good management practices are used, these drawbacks to feeding broiler litter can be overcome.

Objectives

The objectives of this study were to evaluate broiler litter in a series of studies, including these:

A. Preference of weanling steers for diets containing varying levels of broiler litter in a cafeteria-style preference study.

B. Voluntary intake of diets containing varying levels of broiler litter mixed with one of two different sources of more palatable concentrate feeds.

C. Performance of beef replacement heifers over two 140-day winter feeding periods fed diets containing broiler litter with 25 or 50% soybean hulls or 25 or 50% ground corn along with *ad libitum* hay.

Materials and Methods

The experiments were conducted at the Pontotoc Ridge-Flatwoods Branch Experiment Station, Pontotoc, Mississippi, during the winters of 1992-93 and 1993-94. The research protocol for **Objective A** (Preference Study) consisted of using six freshly-weaned crossbred steers in 1992-93 and four steers in 1993-94, averaging 530 and 548 pounds, respectively. Studies were conducted using a randomized complete block experimental design with animals serving as the blocks. This study was designed to determine which of four feed diets containing broiler litter was most preferred when steers were given a choice. Experimental animals were placed in individual 8-foot x 8-foot feeding pens for 2 hours each morning for a 10-day period and offered four free-choice experimental diets. The four experimental diets accessible to steers consisted of:

1. 50% corn-50% broiler litter (50% C-50% BL)
2. 25% corn-75% broiler litter (25% C-75% BL)
3. 50% soybean hulls-50% broiler litter (50% SBH- 50%BL)
4. 25% soybean hulls-75% broiler litter, (25% SBH-75% BL)

Steers were placed in individual feeding pens and were given measured amounts of each of the four diets. After the 2-hour measurement period, steers were removed and refusals were weighed. Daily intake was calculated for each animal by subtracting the weight of the refusals from the original weight of each of the four diets offered. During periods when steers were not in the feeding pens, the animals had free access to a mineral supplement, hay, and water. For 7 days prior to the trial, the animals had free access to diets of 50% C-50% BL and 50% SBH-50% BL to gain exposure to the odor and taste of the broiler litter-based diets.

Objective B (Voluntary Intake Study) utilized a 4 x 4 Latin Square experimental design with animals and time serving as the blocking factors. The same study animals and experimental diets from Objective A were used and the study attempted to determine what feed intake levels could be obtained from each of the four diets if animals were allowed only one of the diets at a time.

All aspects of the research protocol remained identical to those used in Objective A with the exception that the trial length was reduced from a 10-day study period to a 5-day study period for each of the four diets (20-

day study period for each animal). Each animal received only one of the four diets for a continuous 5-day period and then rotated to the next diet for another 5-day period. After each 2-hour feeding period, refusals were weighed and subtracted from the original weight to determine daily intake for each diet.

The performance of replacement heifers **(Objective C)** was measured using 80 freshly weaned crossbred heifers in a randomized complete block experimental design, with animals being blocked according to weight and breed type and allotted to one of five treatment groups consisting of 16 heifers per group. Initial average heifer weight in 1992-93 was 429 pounds, while the 1993-94 weanling heifers averaged 359 pounds. Each treatment group was assigned to one of five experimental feed diets for the duration of the 140-day winter feeding trial. Intake of the broiler litter-based supplements was restricted to not more than 1% of body weight of heifer groups per day to prevent over-consumption and to minimize feed requirements.

Animals were maintained in 5-acre fields of dormant bermudagrass during the wintering trials. Groups were rotated through the pens at 28-day intervals coinciding with weigh days. Initially, all heifers were dewormed and given booster vaccinations against all diseases endemic to the area. Heifers had previously been administered the MIMS (Maximize Immunity Minimize Stress) health program. (MIMS is a vaccination, parasite control, castration, and dehorning program applied prior to weaning to minimize calf stress).

Fresh water, *ad libitum* hay, and a mineral supplement were available to heifers at all times. Heifers were allotted to treatments and fed their experimental diets during a 14-day preliminary period to gain exposure to the odor and taste of broiler litter-based diets. After the 14-day acclimation period, initial weights were taken and trials began.

The five feeding diets used in the heifer performance study consisted of the following:

1. Control diet (2 lb corn + 1 lb soybean meal/head/day), plus hay.
2. 50% corn-50% broiler litter, plus hay (50% C-50% BL)
3. 25% corn-75% broiler litter, plus hay (25% C-75% BL)
4. 50% soybean hulls-50% broiler litter, plus hay (50% SBH-50% BL)
5. 25% soybean hulls-75% broiler litter, plus hay (25% SBH-75% BL)

The diets were mixed using a New Holland 355 feed grinder and formulated not more than 2 weeks before feeding. A chemical analysis of the broiler litter used in the trials is shown in Table 1. Samples of hay used in the studies were taken and reported a range in crude protein of 5.8-6.5%, ADF of 47.4-48.1%, and a TDN value of 42.4-43.0%. This resulted in the hay quality being classified as "poor." The poor quality hay served as a roughage source only without supplying high protein levels, which would alter gains produced by the experimental diets.

Feeding techniques used varied between diets and stage of the trial. In both years, the control diet was hand-fed daily, while the broiler litter-containing diets were fed *ad libitum* in bulk feeders until the end of the first weigh period (28th day of trial). During this time, daily feed intake of litter-based diets ranged from 0.25% body weight (1.01 lb/head) to 3% body weight (12.9 lb/head), increasing as the trial progressed. Beginning on day 29, litter-containing diets were hand-fed daily, with each group receiving feed equal to 1% of the individual group's average body weight.

Data in all three trials were subjected to analysis of variance, and means separated using Fisher's Protected Least Significant Difference at the 0.05 level of probability (Steel and Torrie, 1960).

Results and Discussion

Results of the preference feeding study demonstrated similar preferences for feed diets among study animals for both trial years. The 50% SBH-50% BL diet was the most preferred (P>.05) feed mixture by animals over the two trial periods, with an average daily intake (ADI) of 5.23 lb/day compared to the 50% C-50% BL mixture, which had a significantly lower ADI of 3.07 lb/day. As expected, the two feed mixtures containing 75% broiler litter were the least preferred diets with 25% SBH-75% BL and 25% C-75% BL having an ADI of 0.32 and 0.20 lb/day, respectively.

The ranking of the four diets was consistent over both years, but the actual ADI varied considerably as there was a significant year/ration interaction (Table 2). These results agree with those of other researchers (Noland et al., 1955; Fontenot et al., 1966), who reported that broiler litter is not an extremely palatable feed for ruminants and that total dietary intake was increased by substituting more palatable feeds for broiler litter.

The voluntary intake trial showed little differences between rations, years, or ration/year interactions. Mean comparisons in 1992-93 showed the highest consumed diet being 50% C-50% BL at 11.15 lb/head/day, which was only greater (P>.05) than the 25% C-75% BL diet. Consumption rates for the 50% SBH-50% BL and 25% SBH-75% BL diets were similar with an ADI of 8.28 and 8.95 lb/day, respectively. The 25% C-75% BL diet yielded the lowest average daily intake with 7.35 lb/day.

For the 1993-94 intake trial, differences were found between feed intake of rations. The 50% SBH-50% BL and 50% C-50% BL diets yielded 12.42 and 11.90 lb intake daily, which was greater than two lowest yielding diets. Average daily intake levels are listed in Table 3.

When rations were subjected to mean comparisons across both 1992-93 and 1993-94 trial periods, no diet statistically differed from that of another diet. Although no diet was significantly different from another at the 5% probability level, a trend appears for feed intake of diets containing 50% broiler litter to be consumed at a higher level than were the diets containing 75% broiler litter. These results support the conclusions by others (Ruffin and McCaskey, 1991; Bagley and Evans, 1995) that dietary intake can be increased by substituting higher levels of more palatable feeds for broiler litter. The apparent discrepancy between the preference trial where the 50% SBH-50% BL diet was the most preferred diet and the voluntary intake trial where the 50% C-50% BL diet had the highest consumption level has no obvious explanation.

Under Objective C for comparing heifer performance, a general trend developed for the control diet and the 50% SBH-50% BL diet to produce the highest overall ADG (0.59 and 0.57 lb, respectively) (Table 4). These gains were greater (P>.05) than ADG for the 50% C-50% BL diet (0.38 lb), 25% C-75% BL diet (0.38 lb), and the 25% SBH-75% BL diet (0.34 lb). Generally, these trends are found throughout each 28-day weigh period for the 2 years of the trial.

When reviewing only the 1992-93 winter period, the total ADG finished in the same order as the 2-year average with the exception of the 50% SBH-50% BL diet yielding the highest ADG. The ADG for the 50% SBH-50% BL diet (0.80 lb/day) was statistically greater (P>.05) than the three remaining broiler litter diets, which each yielded approximately 0.5 lb weight gain/day (Table 5). There was no statistical difference between the control diet and any other diet, but a trend was seen for the control diet to be slightly greater in ADG than all diets except the 50% SBH-50% BL diet.

The lack of difference in total ADG between the control diet and the three lowest performing diets is because of the 1.1 lb/day weight loss through the first 28-day weigh period for the control group. During this time, the freshly-weaned heifers refused to consume the control diet for the first 22 days of the trial and consumed only the "poor" quality hay. Consumption problems were caused by the cottonseed meal source initially used in this trial. Once identified and the protein supplement changed to soybean meal, heifer gains increased to the anticipated range.

Results from the 1993-94 winter trial were again similar to the overall results with respect to ranking of the diets for average daily gain and total weight gain, although all diets produced a lower total ADG when compared to the 1992-93 weight gains. As seen in Table 6, the control diet produced a greater (P>.05) ADG (0.51 lb) and total weight gain (71.4 lb) than did three of the four diets containing broiler litter (0.33 to 0.15 lb/ADG). While ADG for the control diet was significantly greater (P>.05) than the 25% C-75% BL, 50% C-50% BL, and the 25% SBH-75% BL diets, the 50% SBH-50% BL diet was not statistically different from any other diet used, including the control diet.

As earlier stated, the 1993-94 weight gains were, on average, lower than the 1992-93 weight gains. The below-normal weight gains were probably a combined result of the extremely cold temperatures recorded throughout the 1993-94 winter months and the lightweight heifers used in this trial period. During the December-January weigh period, the National Weather Service Observation Site located on the Pontotoc Branch recorded 25 days in this 28-day weigh period when the minimum temperature was below 32° F. Energy levels from the experimental diets at 1% body weight were insufficient for maintenance and weight gains at these low temperatures, particularly when fed the poor quality hay that was a major dietary component of these treatments.

The November-December 1992-93 weigh period showed four of the five treatments losing weight with the remaining treatment having no change. The study animals used appeared highly stressed and very nervous upon recent arrival to the Pontotoc Station. For these reasons, feed consumption was erratic and weight loss occurred. The less than desired weight gains during the 1993-94 trial period have no definite explanation. One possibility, however, may be that the study animals were too lightweight for top performance (359 lb/head average weight) as suggested by Ruffin and McCaskey (1991), who recommend feeding broiler litter to beef animals weighing over 450 pounds. Ruminant animals under 450 pounds are not as efficient utilizers of nonprotein nitrogen as more mature animals, and broiler litter crude protein may be as high as 40% nonprotein nitrogen.

Weight gain is an important factor to consider; however, feed cost per pound of gain is probably of greater importance. Using the figures of 41 and 89 cents per pound of gain (Table 7) for the 50% SBH-50% BL and control treatments, one can see a tremendous opportunity to reduce input cost while maintaining similiar weight gains. These two feeding regimens yielded the same weight gains, but the 50% SBH-50% BL treatment reduced feed cost per pound by 48 cents or 54%. A $48 savings per 100 pounds of beef produced makes a large difference to a rancher's bottom line.

While the remaining broiler litter diets demonstrated significantly lower weight gains than that of the control diet, the reduced feed cost still allowed for a potential profit. The 25% SBH-75% BL diet yielded the lowest ADG, however, it reduced feed cost by 37 cents per pound or 42%. The feed treatment of 50% corn-50% BL, which showed the highest cost per pound of gain among broiler litter-based supplements ($0.74/lb), still offered a significant reduction in feed cost of 15 cents per pound of gain, or 17%.

These figures suggest that a slight decline in weight gain would be acceptable if the input for feed cost per pound of gain were reduced. The use of broiler litter as a feed substitute did greatly reduce these costs by 17 to 54% (Table 7).

Conclusion

The use of broiler litter appears to have potential in the cattle industry, not only as a pasture fertilizer (Honeycutt et al., 1988), but also as a supplemental feedstuff. While the diets containing broiler litter, with the exception of the 50% SBH-50% BL diet, yielded a lower ADG than did the control diet (corn + soybean meal), factors such as cost of gain, wintering cost, and the waste disposal potential should be considered in the final evaluation of broiler litter as a feed supplement for beef cattle.

Lower weight gains may be economically acceptable if the cost per pound to produce beef is reduced. This reduction of input cost is easily attained by substituting part of the grain and/or silage diet with the relatively inexpensive broiler litter. Producers should purchase only broiler litter that meets high quality feeding standards as determined by nutrient analysis. Feeding poor quality broiler litter to cattle will result in a low feed intake, causing decreased or even negative weight gains and increased production costs. While total production cost and profit potential were not calculated in this particular research project, feed cost per pound of weight gain was calculated (Table 7).

Although the weight gains from broiler litter treatments were generally lower than that from the control treatment, feed cost per pound of gain and winter feeding cost were reduced from 17 to 54% by using broiler litter as a feed substitute for more expensive grain products. The broiler litter-based supplements all yielded beef replacement heifers that had grown over the winter months and were ready for grazing on summer pastures. With good farm management, weight gains should increase, and purchasing feeds in bulk quantities should further reduce expenses allowing for a more profitable farming operation.

Another factor to be considered is the ability to dispose of this waste byproduct in a manner other than as a fertilizer. When broiler litter is used as a fertilizer, it is generally applied to land located near the poultry house where it originated. This often leads to excessive rates (greater than 4 tons broiler litter/acre) being applied that could increase the nutrient content of soils to excessive levels and potentially increase runoff contamination into streams, lakes, and watersheds. Therefore, using broiler litter as a feedstuff may not only lower beef production cost, it is an environmentally friendly waste disposal system.

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Table 1. Chemical analysis of broiler litter used for preference, voluntary intake, and heifer performance trials at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-1994).

	1992-93	1993-94
	% dry matter[a]	
Ash	20.5	20.2
Crude protein	22.1	20.7
Crude fat	1.4	1.5
Crude fiber	25.3	23.1
Nitrogen-free extract	30.5	33.3
TDN	59.7	60.3

[a]Moisture content of the broiler litter as delivered was 30.9 and 33.5% for 1992-93 and 1993-94, respectively. Moisture content at feeding ranged from 22.9 to 28.7%.

Table 2. Feed preference of broiler litter-containing diets at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-1994).

Treatment [a]	1992-93	1993-94	2-Year Average
	Average daily intake, lb		
50% SBH - 50% BL	2.26 a[b]	8.20 a	5.23 a
50% C - 50% BL	1.45 a	4.69 b	3.07 b
25% SBH - 75% BL	0.54 b	0.10 c	0.32 c
25% C - 75 BL	0.32 b	0.08 c	0.20c
Mean	1.14	3.27	2.20
LSD (0.05)	0.81	1.29	1.62
CV%	46	26	72

[a]Where SBH=soybean hulls, BL=broiler litter, and C=corn.

[b]Mean comparison within columns by Fisher's Protected LSD at P=0.05. Means in the same column with the same letter do not differ at the 5% probability level.

Table 3. Voluntary intake study utilizing broiler litter-containing diets at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-1994).

Treatment[a]	1992-93	1993-94	2-Year Average

	Average daily intake, lb		
50% C - 50% BL	11.15 a[b]	11.90 a	11.53 a
50% SBH - 50% BL	8.28 ab	12.42 a	10.35 a
25% SBH - 75% BL	8.95 ab	9.38 b	9.16 a
25% C - 75% BL	7.35 b	9.58 b	8.46 a
Mean	8.93	10.82	9.89
LSD (0.05)	3.49	1.93	3.64
CV%	23	10	36

[a]Where SBH=soybean hulls, BL=broiler litter, and C= corn.

[b]Mean comparison within columns by Fisher's Protected LSD at P=0.05. Means in the same column with the same letter do not differ at the 5% probability level.

Table 4. Heifer performance on broiler litter supplements averaged across two winter feeding periods at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-94).

	2-Year Average					
	Nov/Dec	**Dec/Jan**	**Jan/Feb**	**Feb/Mar**	**Mar/Apr**	**Total**
Treatment[a]	**ADG 1**	**ADG 2**	**ADG 3**	**ADG 4**	**ADG 5**	**ADG**
	Wt gain, lb					
Control	-0.4 b[b]	1.1 a	0.8 a	1.3 a	1.6 a	0.59 a
50% SBH-50% BL	0.1 a	0.5 b	0.1 b	1.3 a	1.4 ab	0.57 a
50% C - 50% BL	0.4 a	-0.1 c	0.8 a	0.5 c	0.9 b	0.38 b
25% C - 75% BL	0.3 a	0.0 c	0.2 b	1.0 b	1.0 ab	0.38 b
25% SBH-75% BL	0.4 a	-0.1 c	0.3 b	1.0 b	1.0 ab	0.34 b
Mean	0.17	0.28	0.44	1.03	1.19	0.45
LSD (0.05)	0.29	0.30	0.30	0.27	0.58	0.14
CV%	351	215	140	52	98	65

[a]Where SBH=soybean hulls, BL=broiler litter, C=corn, and Control=corn + soybean meal.

[b]Mean comparison within columns by Fisher's Protected LSD at P=0.05.Means in the same column with the same letter do not differ at the 5% probability level.

Table 5. Heifer performance on broiler litter supplements during the winter of 1992-93 at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-1993).

	Nov/Dec	**Dec/Jan**	**Jan/Feb**	**Feb/Mar**	**Mar/Apr**	**Total**
Treatment[a]	**ADG 1**	**ADG 2**	**ADG 3**	**ADG 4**	**ADG 5**	**ADG**
	Wt gain, lb					
Control	-1.1 b[b]	1.7 a	1.2 a	1.1 b	0.6 d	0.67 ab
50% SBH-50% BL	-0.1 a	1.1 b	0 c	1.8 a	1.2 ab	0.80 a
50% C - 50% BL	-0.1 a	0.3 c	1.3 a	0.5 c	0.8 cd	0.55 b

25% C - 75% BL	0 a	0.2 c	0.4 b	1.2 b	1.0 bc	0.54 b
25% SBH-75% BL	-0.1 a	0.2 c	-0.1 c	1.3 b	1.3 a	0.53 b
Mean	-0.28	0.70	0.54	1.16	0.97	0.62
LSD (0.05)	0.36	0.33	0.33	0.39	0.34	0.20
CV%	-181	66	86	47	50	46

[a]Where SBH=soybean hulls, BL=broiler litter, C=corn, and Control=corn + soybean meal.

[b]Mean comparison within columns by Fisher's Protected LSD at P=0.05. Means in the same column with the same letter do not differ at the 5% probability level.

Table 6. Heifer performance on broiler litter supplements during the winter of 1993-94, at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1993-1994).

	Nov/Dec	Dec/Jan	Jan/Feb	Feb/Mar	Mar/Apr	Total
Treatment[a]	**ADG 1**	**ADG 2**	**ADG 3**	**ADG 4**	**ADG 5**	**ADG**
	Wt gain, lb					
Control	0.4 b[b]	0.5 a	0.4 ab	1.6 a	2.5 a	0.51 a
50% SBH-50% BL	0.4 b	0 b	0.3 ab	0.9 b	1.7 ab	0.33 ab
50% C - 50% BL	0.9 a	-0.6 c	0.3 ab	0.4 c	1.0 b	0.20 b
25% C - 75% BL	0.5 ab	-0.2 bc	0.1 b	0.9 b	1.1 b	0.22 b
25% SBH-75% BL	0.9 a	-0.4 bc	0.6 a	0.7 bc	0.7 b	0.15 b
Mean	0.62	-0.14	0.33	0.90	1.41	0.28
LSD (0.05)	0.43	0.48	0.41	0.29	1.05	0.21
CV%	99	-471	172	45	105	105

[a]Where SBH=soybean hulls, BL=broiler litter, C=corn, and Control=corn + soybean meal.

[b]Mean comparison within columns by Fisher's Protected LSD at P=0.05. Means in the same column with the same letter do not differ at the 5% probability level.

Table 7. Feed cost per pound of weight gain and winter feeding cost per 140 days for heifer performance trail at the Pontotoc Ridge-Flatwoods Branch Experiment Station (1992-1994).

Treatment[a]	**$/lb Gain[b]**	**Winter Feeding Cost ($)[c]**
50% SBH- 50% BL	0.41	32.30
25% SBH - 75% BL	0.52	24.80
25% C - 75% BL	0.60	31.50
50% C - 50% BL	0.74	39.25
Control	0.89	73.40

[a]Where SBH=soybean hulls, BL=broiler litter, C=corn, and Control=corn + soybean meal.

[b]$/lb gain figured using the following price per ton for each feedstuff: corn @ $180, SBH @ $100, SBM @ $280, BL @ $10, hay @ $40 and mineral supplement @ $200.

[c]Winter feeding cost figured using previous feed prices x total feed consumed over two winter feeding periods and dividing by 2 to yield winter feeding cost per 140 days/head.