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# EFFECT OF REPLACING WHOLE COTTON SEED WITH COTTON SEED CAKE ON MILK YIELD, FAT CONTENT AND COST OF FEEDING OF HOLSTEIN FRIESIAN COWS

Animal Resource

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## ABSTRACT

Three hundred and twenty Holstein Friesian milking cows were used in two trials to evaluate the effect of replacing whole cotton seed cake (WCS) with cotton seed cake (CSC) in daily rations on milk yield , milk fat content and the cost of feeding .

The experimental animals were distributed into two equal groups (Trials 1 and 2) of 160 cows each. Each group was subdivided into two groups of 80 cows each based on milk production. In Trial 1 the group had initially a lower milk yield (25-30 liters/cow/day) than the group in Trials 2 (30-35 liters/cow/day). In both Trials 80 cows were fed WCS and the other 80 were fed CSC in the feeding ration for a period of 5 weeks (one week adaptation and four weeks experimental period). The results revealed no significant difference (P>0-05)in neither milk yield nor milk fat content but there was a significant difference (P<0.05)in the cost of replacing whole cotton seed by seed cake .Hence incorporating cotton seed cake (CSC) in dairy ration had an economical advantage.

## KEYWORDS

WCS is Whole Cotton Seed, CSC is Cotton Seed Cake

## INTRODUCTION

Feeding has a great influence on the profitability of the dairy enterprises. Dairy cows should be fed well balanced ration as a prerequisite for optimal milk production. Such a ration should meet nutrition requirement mainly the energy and protein for maintenance and growth , reproduction and milk production .Whole cotton seed is a popular feed for dairy producers. It is added to the rations of milking cows for its energy , protein and fibre contents in concentrations greater than many feed ingredients .Its usage has increased during the past ten years. It can be fed just as it comes from the gin factories without processing or may be pelleted before feeding . Whole cotton seed has a higher amounts of gossypol than cotton seed cake. The gossypol in cotton seed cake is more readily available (Lane and Lorry, 2012). Continuous increase in the price of whole cotton seed dictates an evaluation for an alternative in dairy rations to supply the nutrient requirements for an optimum milk production and the economics of feeding .

The objective of this study was to look at cotton seed cake (CSC) as an alternative to whole cotton seed (WCS) which is currently used in in dairy farms.

## MATERIALS AND METHODS

### Animals, Feeds and Experimental Protocol

Three hundred and tents Holstein Frisians milking cows were used in two trials (Trial 1 and Trial 2)of 160 cows in each trial. The cows in each Trial were further divided into two groups of 80 cows each indicated later as Group A and Group B . In Trial 1 the initial milk production of the cows ranged between 25 to 30 liters /cow/day. While in Trial 2 the initial milk production ranged between 30to 35 liters /cow/day .In both trials Group A was offered whole cotton seed (WCS)AL DAHRA BIO AGR.S.R)on average of 2.4 kg/cow/day. Group B was offered cotton seed cake (ARASCO)at 2.8 kg /cow/day

Both groups (Group A and Group B) received other feed ingredients as shown Table 1 . In Trial 1 each group received the quantity in the mixed ration as 25 kg/head/day while in Trials 2 the quantity of the total mixed ration received by each group was 30 kg/head/day . In both trials the feed was offered three times a day every eight hours. Weekly milk yield for each cow was recorded and samples of milk from each group from both trials was taken for analysis of fat content.

***Table (1):*** **The ingredients and composition of feeds used in Trial 1 and Trial 2 by Group A (fed WCS) and Group B (fed CSC)**

| Item | Group( A) | | Group (B) | |
|---|---|---|---|---|
| | % | Kg | % | Kg |
| Alfalfa hay | 42.9 | 10.8 | 40.4 | 10.8 |
| Whole Cotton Seed(WCS) | 9.5 | 2.4 | -- | -- |
| Cotton Seed Cake(CSC) | -- | -- | 10.5 | 2.8 |
| Corn Flakes | 5.6 | 1.4 | 5.2 | 1.4 |
| Sugar Beet | 6.3 | 1.6 | 6.4 | 1.7 |
| Milking Pellets (17%) | 35.7 | 9.0 | 37.5 | 10.0 |
| Total | 100 | 25.2 | 100 | 26.7 |

### Chemical Analysis

The chemical analysis of WCS and CSC in terms of dry matter (DM) other nutrients was done according to (A.O.A.C,1980) .

### Statistical Analysis .

The data was statistically analyzed by using Analysis of variance (ANOVA)according to Steel and Torrie (1980).

## RESULTS AND DISCUSSION

Table 2 shows the chemical composition of the whole cotton seed (WCS) and the cotton seed cake (CSC) used in this study .CSC showed a higher protein content and a lower energy content than the WCS. This is probably due to the method of industrial extraction.

***Table (2):*** **Chemical analysis of whole cotton seed and cotton seed cake:**

| Nutrient | Whole Cotton Seed (WCS) | Cotton Seed Cake (CSC) |
|---|---|---|
| Dry Matter % | 93.9 | 94.4 |
| Crude Protein % | 18.2 | 26.4 |
| Acid Detergent Fibre % | 33.3 | 30.8 |
| Neutral Detergent Fibre% | 48.2 | 42.6 |
| Ash % | 4.0 | 5.3 |
| Net Energy Kcal/Kg DM | 1710.9 | 1538.3 |
| Ether Extract % | 21.5 | 12.2 |
| Calcium% | 0.20 | 0.24 |
| Phosphorus % | 0.67 | 0.79 |
| Magnesium % | 0.34 | 0.40 |
| Sulphur % | 0.24 | 0.39 |
| Potassium % | 0.96 | 1.36 |
| Sodium % | 0.02 | 0.01 |
| Manganese mg/Kg | 18.4 | 20.8 |
| Iron mg/Kg | 205.4 | 280.9 |
| Copper mg/Kg | 9.5 | 16.1 |
| Cobalt mg/Kg | 1.16 | 0.71 |
| Zinc mg/Kg | 40.0 | 57.2 |
| Molybdenum mg/Kg | 1.31 | 1.47 |
| Selenium mg/Kg | 0.08 | 0.09 |

The average daily milk yield and milk fat content of cows in both trials is shown in Table 3. Whole cotton seed, though showed a slight increase in milk yield in both Trials as compared to cotton seed cake but that was not significant .

***Table (3):*** **Average milk yield (liters /group/day) (liter/cow/day) and percentage & milk fat in trial 1 and Trial 2**

**Trial 1**

| Feed | Number of Cows | Days on Lactation | Average milk yield /liters group/day | Average milk/yield liters/cow /day | Average milk fat % |
|---|---|---|---|---|---|
| WCS | 80 | 234 | 2256 a | 28.2 a | 3./a |
| CSC | 80 | 236 | 2248 a | 28.1 a | 3./a |

**Trial 2**

| Feed | Number of Cows | Days on Lactation | Average milk yield /liters group/day | Average milk/yield liters/cow /day | Average milk fat % |
|---|---|---|---|---|---|
| WCS | 80 | 226 | 2256 b | 32.4 b | 3.1/b |
| CSC | 80 | 221 | 2248 b | 32.2 b | 3.1/b |

Means in same column in each separate Trial with the same superscripts are not significantly (P>0.05)different

WCS : Whole cotton Seed
CSC : Cotton Seed Cake

In both Trials milk fat did not show any difference as affected by the type of feed. Table 4 shows the cost of feeding whole cotton seed and cotton seed cake in both Trials.

***Table (4):*** **The daily cost of feeding whole cotton seed (WCS)and cotton seed cake (CSC) in Trials 1 and 2**

**Trial 1**

| Feed | Number of Cows | Amount of feed(kg/cow/day ) | Value of feed SR/kg | Total Value SR/kg |
|---|---|---|---|---|
| WCS | 80 | 2.4 | 1.37 | 263.04 a |
| CSC | 80 | 2.4 | 1.06 | 203.52 b |

**Trial 2**

| Feed | Number of Cows | Amount of feed (kg/cow/day ) | Value of feed SR/kg | Total Value SR/kg |
|---|---|---|---|---|
| WCS | 80 | 2.8 | 1.37 | 306.88 a |
| CSC | 80 | 2.8 | 1.06 | 237.44 b |

The feed cost per kg for WCS and CSC was 1.37 and 1.06 SR (Saudi Rial ) respectively . Thus for the groups in Trial 1 , the cost of feeding WCS to the group was 263.04 SR while that for feeding CSC was 203.52 SR with a total value difference of 59.52 SR . In Trial 2 the cost of feeding WCS to the group was 306.88 SR while that for CSC was 237.44 SR with a total value difference of 69.44 SR . In both Trials the total value of feeding whole cotton seed was significantly ( P<0.05) higher than that of feeding cotton seed cake. Hence, considering the higher price SR/Ton for WCS as compared to CSC and that there is no significant difference in milk yield it would be justifiable to save 310 SR per ton of feed to replace the WCS with CSC in milking cows rations.

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