Abstract
The goal of this study was to find a cost that will decrease input while also improving animal performance. The project was split into two phases. Phase I included a twenty-one-day pre-experimental trial to prepare the animals for the trial without a rumen modulator. Using an in vitro gas production test, phase II was conducted for 120 days with a mixture of rumen modifiers that included neem seed powder (Azadirachta indica), fennel seed (Foeniculum vulgare), and harad (Terminalia chebula) mixed in a concentrate mixture. The amount of Rumen modifier needed was determined based on the dry matter intake of heifers.

There were 21 animals in all in the trial, which was divided into three treatments. The first treatment was a control therapy without the use of a rumen modification. The second treatment used a rumen modification to increase the dry matter intake of the animals by 2%, while the third treatment used a rumen modifier to increase the dry matter intake of the animals by 4%. The treatment that included soybean straw as dry fodder, Lucerne as a green fodder, and a concentrate mixture had no significant (P>0.05) influence on the animals' body weight gain, digestibility coefficient, or dry matter intake.

Treatment two, in which seven animals were fed dry soybean straw, green lucerne, and a concentrate mixture with a herbal feed additive, rumen modifier powder, at a rate of 2% of dry matter intake, produced the greatest outcomes of all the treatments. The weight of the animals grew significantly (P<0.01) by 63.45 kg, whereas the dry matter intake increased significantly (P<0.01) from 6.55 to 7.15 kg. In treatment two, the digestibility coefficient shows excellent results. When compared to the control group, it increases considerably (P<0.01) by 63.45% in treatment two.

Feed cost per kg body weight gain in T1, T2 and T3 was Rs. 32.96, 27.92, 37.90, respectively which indicates the cost per kg gain of weight can be reduced by feeding rumen modifier. The cost/kg body weight gain was lowest in rumen modifier @ 2% over another concentrate feeding. However, based on the gain in body weight it can be said that there was the effect of incorporation of rumen modifier with concentrate mixture in the ration of heifer because, the total cost/kg body weight gain (Rs.) is less in T2 followed by T1 and T3 group of treatments, 195.49, 230.76 and 265.32 respectively.

Keywords: Rumen modifier, cost structure, crossbred heifers

Introduction
Ruminants’ rumens have a complex microbial ecosystem that allows them to bio-convert low-quality lingo cellulose diet into important animal products such as milk and meat. The polysaccharides in the feed are transformed into volatile fatty acids and microbial protein, the two main sources of energy and protein for the host animals, in the rumen, thanks to the synergistic activity of bacteria, protozoa, fungus, archaea, and bacteriophages. However, CO2 and H2 gases are created as by-products of feed fermentation in the rumen, and rumen methanogenic archaea convert CO2 to methane by utilizing H2 that is eructated out through the mouth.

Every day, 500-600 liters of molecular hydrogen are created in an adult bovine or buffalo, but due to methanogenesis, it never accumulates in the gaseous phase of the rumen. Methanogenesis is a necessary metabolic process in the rumen to maintain a low H2 pressure, but it is wasteful because 2-12% of dietary energy is wasted as methane, reducing the potential conversion of dietary energy into metabolizable energy and lowering the animal's feed utilization efficiency.
Furthermore, because methane is a powerful greenhouse gas with a global warming potential 23 times greater than CO₂, intestinal methane production contributes significantly to global warming. As a result, dietitians have been concerned about the inhibition of methanogenesis for a long time, and it is still a problem today owing to global warming and the release of greenhouse gases. The animal can be made more feed efficient and environmental pollution caused by rising levels of greenhouse gases can be decreased by reducing methane production.

Animal nutritionists are experimenting with newer nutritional interventions, such as chemical feed additives, to reach their goal. However, as people became more aware of the negative consequences of chemical feed additives, such as residues in animal products and bacterial resistance to antibiotics, researchers began looking for natural products to use as feed additives, and plant secondary metabolites (PSMs) emerged as a viable alternative. Thus, some herbal powders which are having plant secondary metabolite contents are very expensive. Hence, it is important to calculate the cost structure of feeding crossbred heifers.

Materials and Methods

The current study used a randomized block design with three different treatments. A total of twenty-one crossbred heifers were chosen. Three groups of heifers were formed. For the study, each group comprised seven heifers. Concentrate mixture, rumen modulator, green fodder, and dry roughages were employed to feed the experimental heifers. In treatment "T1," dry fodder (Soybean straw) was mixed with green fodder (berseem) and a ready-made concentrate combination according to the requirements. In treatment "T2," dry fodder (Soybean straw) was combined with a green fodder (berseem) concentrate mixture and a rumen modiﬁer at a rate of 2%. In treatment "T3", dry fodder (Soybean straw) was combined with a green fodder (berseem) concentrate mixture and a rumen modiﬁer at a rate of 4%.

Maize grain seed, cottonseed cake, wheat bran, turchuni, mineral mixture, and common salt make up the concentrate mixture. Harad seed powder, commonly known as harad, fennel seed powder, and neem seed powder are the three constituents in the rumen modiﬁer.

Results and Discussion

To be popular among cow owners, the feed plan must be cost-effective. As a result, the feeding economics of the several groups were as specific observations on feeding economics are provided in Table 1.

In Table 1, it was observed that the total quantity of soybean straw for the T₁, T₂ and T₃ groups was 322.8, 392.4 and 382.8 kg and the total quantity of green fodder was 106.8, 130.8 and 127.2 kg for T₁, T₂ and T₃ groups. The quantities of concentrate are was in T₁, T₂ and T₃ treatments 214.8, 261.6 and 254.4 kg, respectively.

The total cost of feed observed from the table indicated that it was less in the T₁ group that is Rs. 14439.04 whereas the feed cost was more in T₂ and T₃ treatments respectively. However total cost/kg body weight gain (Rs.) was less in T₁ 195.49 group compared to T₂ 230.76 and T₃ 265.32 group, and total cost/heifer/kg body weight gain (Rs.) is also low in T₁ followed by T₂ and T₃ group of treatments, 67.43, 59.77 and 68.44 respectively.

It was concluded that from above all discussion over experimental result the treatment T₂ feeding of rumen modiﬁer @ 2% shows the better and desirable result as compared to T₁ and T₃ treatments. In T₂ treatment feeding of rumen modiﬁer @ 4% based on dry matter intake of heifers increases the cost of feeding and T₁ feeding of only concentrate mixture hence is not fulﬁlled to the nutrient requirement and growth of heifers but decreases the cost of feeding. Feeding cost on the daily basis was lowest observed in T₂.

Conclusion

On average Rs. 14439.04, 21309.04 and 26949.04 were incurred on the total cost of the feeding of heifers under T₁, T₂ and T₃ treatments respectively. This indicates that there was a decrease in the total feeding cost of the heifers under different concentrate-based diets. The growth rate of heifers fed on rumen modiﬁer @ 2% was higher than that of rumen modiﬁer @ 4% and concentrate mixture feed. The performance in respect of weight, length, height, chest girth gain was higher in the T₂ feeding group over T₁ and T₃ treatments. It was concluded that from above all discussion over experimental results the treatment T₂ shows the better and more desirable result as compared to T₁ and T₃ treatments. Feeding cost on the daily basis was the highest observed in T₃.

References


