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# Effect of Incorporating Different Level of Dried Brewers Grain on Body Weight Gain of Khari Goats

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**ABSTRACT**

An experiment was conducted at National Goat Research Programme, Bandipur, Tanahu from 16th May to 13th August 2019 for 90 days to test the effect of dried brewers waste on meat production of Khari goat kids. Altogether 16 Khari goat kids of age 5-6 months were selected from National Goat Research Programme (NGRP) and divided into 4 treatments with 4 replications (one animal in each replication) by using Randomized Complete Block Design (RCBD). The control (T1) and treatment group (T2, T3 and T4) were offered daily with adlib green mixed forage along with concentrate. The dry matter was offered to goat kids at the rate of 1.5% by their body weight. The T2, T3 and T4 groups concentrate feed were replaced by 10%, 20% and 30% dried brewers waste whereas in control group T1 normal concentrates(14%CP) were provided. Feed intake was recorded daily. The average mean weight gain of T1, T2, T3 and T4 group of goat kids reaches from 20.46±2.52, 20.73±2.58, 21.31±2.44, 21.83±2.57, 22.41±2.73, 22.83±2.73 and 23.24±2.80 kg respectively from initial to 15, 30, 45, 60, 75 and 90 days. There was non- significant effect among diet groups at (P>0.05) in terms of meat production. There was non significant (p>0.05) different on feed conversion ratio among the diet groups. So, dried brewers waste could replace normal concentrate up to 30% of its total mass. Experiment suggested that further study should be carried out to precise the other inclusion level of dried brewers waste.

**Key words:** Brewers waste, feed intake, concentrate

## INTRODUCTION

Livestock is an integral part of crop-livestock mixed farming systems in rural area where, goat (*Capra hircus*) occupies an important consideration. Goat is recognized as a important livestock species for poverty reduction, livelihood and food & nutritional security for smallholder farmers in Nepal. Goat farming is also being popular because it can be used as multi-purpose livestock. It is used for meat, milk, manure, leather and draft power in the mountainous region of Nepal. Demand for goat increases during religious festival of Nepalese like Dashain. And it fetches higher price during the period. In Nepal, goat constitute highest population among the total livestock population. In the year 2020/21, the population of goat is about 10986114 MoAC. Due to the requirement of low initial investment, high prolificacy and high value of meat, goat farming is gaining popularity in Nepal. It has been reported that about 86% of meat demand of goat is fulfilled by domestic production (Nepali *et al.*, 2012). Though it seems to be a growing business, there has not been major uptake of commercial goat farming in Nepal.

Brewer's waste are the byproduct of brewery industry which uses malted barley grains feed stock (Zanton *et al*, 2016). When grain is fermented to produce ethanol, primarily the starch is utilized, leaving behind a protein rich residue that can be used in livestock diets and locally known as Beer waste. Luu *et al*, (2000) stated that the interest in feeding brewers waste has increased because of comparatively less cost.

Feeds and fodders are the important factor for meat and milk production. The farmers are paying high cost for the feeds as they are being purchased from neighboring countries because the raw material or the ingredients needed for the feed which we have are not in sufficient amount. To minimize the feed cost there are many industrial by products such as brewery waste which can be used somehow to replace the cost of concentrate feed in the diet of cattle and goat. Most of the cattle rearing farmers are having marginal and small farmers who depends mainly on the raw materials for feeding the animals as the agricultural land availability is not sufficient to meet their requirement. In order to make the dairy farming sustainable, the locally available unconventional agro-industrial by products are increasingly used as animal feed.

In our context the feeding of brewers waste is not commercial but the farmers are using the wet brewers waste because of their availability only in beer industry areas. They are feeding their cattles and dairy animals in traditional ways without any effective feeding package. Therefore, brewers waste feeding technologies are necessary. During winter season the brewers waste would be good dietary supplement for the ruminants. For feeding ruminant animals the brewers waste is beneficial to increase milk and during advance pregnancy stage because of high protein content.

In ruminant farming, feeding of roughages requires so much lab our, mostly because of bulkiness of roughages like hay, silage, mechanical handling, transport and provendering is difficult. But the brewers wastes are sundried because of high moisture content and then can be stored for a longer period. In winter season feed scarcity is great problem in Nepal so, dried brewers waste feeding in dairy animal is definitely good feeding method. This feeding technology definitely improves the milk production and reduces the feed cost.

## MATERIALS AND METHODS

**Experimental animals**

The experiment was carried out at National Goat Research Programme, Bandipur, Tanahu for 90 days from 16th May 2019 to 13th August 2019 with one week adaptation period. There were 16 Khari goat kids of 5 to 6 months age with 4 treatment and were replicated four times having one goat kids in each replication by using Randomized Complete Block Design (RCBD). All experimental animals health were examined and they were drenched with Fenbendazole @ 10mg/kg body weight against internal parasites before assigned in experiment following the adjustment period of one week before the trial initiation.

**Diet Composition**

All the groups of animals were fed with concentrate at the rate 1.5% of body weight. The control group (T1) was offered without dried brewers waste inclusion in their diets whereas T2, T3 and T4 group of goat kids were offered concentrate mixture replaced with 10%, 20% and 30% dried brewers waste respectively in their diets.

**Chemical Analysis**

Representative samples were analyzed for dry matter (DM), crude protein (CP), crude fiber (CF), total ash content (TA) and gross energy (GE). The dry matter was determined by oven drying the sample overnight at 100C for 24 hours. Crude protein of the samples was determined by using the Kjeldahl method. Ash content of the samples was determined by ashing the sample at 550C in Muffle furnace for 3 hours (AOAC, 1980). Crude Ether of the samples was determined by using the Van Soest method (Goering, H.K and Van Soest 1970).

**Experimental Diet**

The following experimental diet was provided to the experimental animals (Table 1).

**Table1: Experimental diet for goat**

| Treatment | Diet |
|---|---|
| T1 | Concentrate mixture @ 1.5% of body weight + Seasonal fodder adlib |
| T2 | Concentrate mixture (replaced by 10% DBG) @ 1.5% of body weight + Seasonal fodder adlib |
| T3 | Concentrate mixture (replaced by 20% DBG) @ 1.5% of body weight + Seasonal fodder adlib |
| T4 | Concentrate mixture (replaced by 30% DBG) @ 1.5% of body weight + Seasonal fodder adlib |

**Feeding Regime**

Compound feed and adlib amount of fodder was provided to the experimental animals individually in plastic vessel. Compound feed was provided once a day in the morning where as fodder was supplied twice a day (morning and evening). Quantity of compound feed and fodder given daily to the animals was weighted daily and refusal was weighted in next morning. Experimental goat kids were provided free access to drinking water.

**Data Measurement**

The trial period lasted for 90 days with an adaptation period of one week. Total feed intake of goat kids were recorded daily. The body weight gain of individual animals was measured at 15 days interval.

**Data Analysis**

Data of daily feed intake and fortnightly body weight gain were analyzed by using "One way ANOVAs" test for every measurement using statistical package SPSS software 2006, with released versions 15.0.

## RESULT AND DISCUSSION

**Chemical composition of concentrate mixture**

The chemical composition of concentrate mixture and dried brewers waste is given in Table 2

**Table 2: Chemical composition of compound feed (on DM basis)**

| Concentrate mixture | FDM | CP | CF | Energy (Kcal/kg) |
|---|---|---|---|---|
| Concentrate feed | 93.40 | 16.50 | 7.10 | 2627.54 |
| Dried brewers waste | 22.72 | 17.58 | 27.72 | 3285.94 |

**Table 3: Feed intake of the experimental animals/day**

| Feed stuffs intake | Mean ± SD | | | |
|---|---|---|---|---|
| | T1 | T2 | T3 | T4 |
| Feed intake, g | 180.15±24.07 | 183.79±27.38 | 185.31±31.03 | 187.14±33.04 |
| Fodder intake, g | 1432±0.04 | 1511.76±0.04 | 1528±0.05 | 1536±0.05 |
| Dry matter intake/day, g | 310.90 | 324.74 | 326.17 | 330.37 |
| Total dry matter intake (DMI), kg | 27.80 | 29.40 | 29.53 | 29.91 |
| Feed conversion ratio | 5.1:1 | 4.4:1 | 4.6:1 | 3.6:1 |

Average feed intake of the experimental animals showed that highest compound feed intake was found highest in T4 (187.14) followed by T3 (185.31), T2 (183.79) and T1 (180.15) respectively. However, average fodder intake was found significant ($p<0.05$) in group T1 (1432 g) where as fodder intake was found non significant ($p>0.05$) among the treatments T2 (1511 g) T3 (1528 g) and T4 (1536 g) respectively. Dry matter intake was found highest in T4 (29.91 kg) followed by T3 (326.17 kg), T2 (29.40 kg) and T1 (27.80 kg) respectively which was non significant ($p>0.05$) among the treatments. Likewise feed conversion ratio was found highest in T1 (5.1:1) followed by T3 (4.6:1), T2 (4.4:1) and T4 (3.6:1) respectively.

**Table 4: Body weight gain trend of experimental goat kids, kg (Mean±SD)**

| Treatment | Initial | 15 days | 30 days | 45 days | 60 days | 75 days | 90 days | Final body wt. |
|---|---|---|---|---|---|---|---|---|
| T1 | 20.46±2.04 | 20.85±2.09 | 21.25±1.87 | 21.25±2.27 | 22.05±1.73 | 23.00±2.09 | 22.27±2.28 | 3.6±0.24 |
| T2 | 20.72±2.00 | 20.95±2.19 | 21.35±2.22 | 21.52±2.44 | 21.80±2.46 | 21.15±2.43 | 22.37±2.31 | 4.0±0.31 |
| T3 | 19.92±1.07 | 20.57±1.52 | 21.07±1.96 | 21.52±2.23 | 22.47±2.45 | 22.30±2.48 | 22.60±2.58 | 6.6±1.51 |
| T4 | 20.37±4.66 | 20.57±4.66 | 21.40±4.08 | 22.32±4.06 | 23.32±4.53 | 23.87±4.30 | 25.02±4.03 | 3.1±0.63 |
| Mean | 20.46±2.52 | 20.73±2.58 | 21.31±2.44 | 21.83±2.57 | 22.41±2.73 | 22.83±2.73 | 23.24±2.80 | ±0.28 |
| P-value | P>0.05 | P>0.05 | P>0.05 | P>0.05 | P>0.05 | P>0.05 | P>0.05 | P>0.05 |

There was non-significant ($p>0.05$) effect between treatment groups in weight gain during the experimental periods.

The average mean body weight gain was 20.46 kg in initial days which reaches up to 23.24 kg at the end of the experiment. At 15 days the body weight gain was found highest in T2 (20.95 kg) which was followed by T1 (20.85 kg) and found same in both the treatments T3 and T4 (20.57 kg). At 30 days the highest body weight gain was found in T4 (21.40 kg) which was followed by T2 (21.35 kg), T1 (21.25 kg) and T3 (21.07 kg) respectively. At 45 days the highest weight gain was found in T4 (22.32 kg) which was found same in both the treatments T2 and T3 (21.52 kg) and lowest in T1 (21.25 kg) respectively. Where as in 60 days 75 and 90 days the highest weight gain was found in T4 (23.32, 23.87 and 25.02 kg) respectively which was followed by T3 (22.47, 22.30 and 22.60 kg) respectively by all three treatments. There were non significant ($p>0.05$) found among the groups in body weight gain of the experimental animals.

## Discussion

This experiment was initiated with an aim to increase the meat production of Khari goat kids by the inclusion of different level of dried brewers waste for the reduction of feed cost. The average mean weight gain was found 20.46 kg in the initial days which reaches up to 23.24 kg in 90 days. There was non significant ($p>0.05$) difference in weight gain found among the treatments. However, the highest weight gain was found in T4 in all 60, 75 and 90 days i.e. (23.32 kg), (23.87 kg) and (25.02 kg) respectively in which the goat kids were fed with 30% dried brewers waste (DBW). Whereas lowest in control group T1 in which no inclusion of dried brewers waste (DBW). According to Subba *et al.,* (1999) in series of feeding trial including measurement of intake and palatability of fodder and unconventional feeds by ruminants varies according to the locality in our Nepalese context.

Proper feed intake is essential to maintain a sound growth performance (Shrestha and Pokharel, 2012). Several authors have worked to find out the effect of feed intake on the productive trait of indigenous goats of Nepal. Shrestha *et al.,*2012, reported that the importance of proper nutrition to fully express the genetic potential. Therefore, proper and balanced feeding is essential to obtain an efficient weight gain. Growth performance study carried out on male goat kids showed a linkage between the quality aspect of feed and the higher growth rate and weight gain of goat kids (Shah *et al.,* 2012). According to (Dhami *et al.,* 2015) supplementation of 14 to 16 % CP content during the early growth of kids in grazing based system is found to have positive effect on growth performance and weight gain and also reported that feed conversion ratio per kg body weight gain was observed higher for forest mixed fodder adlib + commercial concentrate mixture @ 1.5% was (22.49:1). Similarly (Khanal, 2012) reported that the there was highest average daily weight gain per goat was found (81.7 gm) feeding with forages and concentrate 1% of body weight gain followed by feeding with maize flour 1% of body weight of goat (76.2 gm) and least (69.6 gm) in forage feeding only.

West *et al*; (1994) reported that there was no difference in milk production who replaced forage in the diet upto 30% DM and 26% DM respectively in dairy animals. However, according to Heuze *et al*; (2017) tested three different levels of wet brewers waste inclusion (13.0 %, 20.6 % and 29.0 % DM) and compared them to the basal diet, the cows fed with wet brewers waste produced more milk. Mean while, Zanton, 2016 observed significant reduction in milk production of dairy cows fed with diets containing wet brewers waste.

According to Luu *et al*: 2000 up to 35% (dry matter basis) brewers spent grain can be included in finishing diets of ruminants by as a forage source without any adverse effect and also said that by using of byproduct in diets is seen to be a way to reduce pollution by industries and a way to provide inexpensive animal feed ingredients. The use of brewers spent grain as a partial replacement for corn silage in beef cattle diet can be adopted as a strategy to reduce feeding cost and also as an alternative source of polyphones from a material that needs to be recycled by Heuze *et al*; 2017. As brewers wastes are easily available from beer industries we can use them in our animals diets.

## Conclusion

Brewers dried waste is relatively cheap and easily available with no competition between human, farm animals and industries. As this present study was therefore designed to determine the feeding value of brewers dried waste as a replacement for concentrate feed and there was no significant difference found in meat production, we can say that the concentrate feed can be easily replaced up to 30% dried brewers waste in goat kids feed.

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