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Small ruminants supplemental feeding regimes in arid agro-pastoral systems in Pakistan

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Abstract

Small ruminant production on arid agro-pastoral based production system requires greater attention in managing feed resources for optimal production. The global warming-climate change, leading to low precipitations further aggravates feed availability and hence animal productivity. To overcome these feed constraints, models were developed in the Pothowar plateau of Pakistan with the objective of improving feeding regimes to ascertain higher animal productivity. The annual fodder production calendar was developed and the deficient period was bridged with improved varieties of fodder. The feed deficient period in winter was alleviated by introducing suitable fodder species, and mixed cropping systems. Fodder based supplemental feed formulations were fed to meet the maintenance and reproduction requirements. The feeding of ewes/does based on balanced range grazing, supplemented with feed options enhanced production; live-weight gain (3-5 kg) and lambs/kids production (80-90%). The comparative assessment with only grazing in rangeland decreased live weight gain up to 2 kg and lowered lambs/kids production (70-75%). The small ruminant farmers adopting above innovations achieved maximum economic returns and thereby improved their socioeconomic livelihood.

Keywords: agro-pastoral, small ruminants, feed formulation

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Introduction

Sheep and goats are excellent source of meat production in Pakistan, producing 37,000 tonnes of meat per annum. There are certain constraints of physiological and infectious origin which limit the growth of this industry in terms of poor production performance and reproductive efficacy. These constraints are drought, shortage of range vegetation (due to overgrazing/utilization of trees/shrubs as fuel wood) and infectious diseases caused by various bacteria, viruses and parasites (Janan et al., 2013). Livestock production is further aggravated by scarcity and fluctuation of the quality and quantity of animal feed throughout the year (Nasrullah, 2014). In Pakistan, there is two fodder scarcity seasons (Summer and Autumn/winter) (Aqeela, 2014). Also there is evidence to indicate that under Pakistan conditions which is based on traditional grazing on fodders and forages, optimum growth in small ruminant production be obtained with appropriate combination of concentrate and forage in the diet (Mahajan et al., 1976).

The sheep and goats, breeding season starts in September/October and ends with lambing/Kidding in March/April. The supplemental feeding is recommended before the breeding, during gestation and also just after lambing/kidding (Ankur 2003). Amongst these



experiences, the use of feed blocks especially for animals grazing poor pastures, multi-purpose shrubs, and agricultural by-products might be considered within feeding strategies to improve reproductive efficiency (Rekik, 2007).

Keeping in view the above mentioned feed/fodder scarcity scenario, present study was conducted to investigate the best suitable annual fodder production practice linked with appropriate concentrates supplementation for small ruminants in Potowar arid area of Pakistan.

Materials and Methods

The main objective of the study was to assess the existing small ruminants feeding practices, find out different improved feeding options linked with higher productivity.

Study 1: Assessment and recommendation of fodder production systems in Chakwal

A group of five small ruminant farmers from each of two sites (Dhulli and Begal) were interviewed on their fodder production practices and was linked with small ruminant's production cycle. The suitable annual fodder production calendar was developed based on fodder availability during the scarcity periods.

Study 2: Assessment of supplemental feeding to small ruminants for improved productivity

Three experiments were conducted to assess the importance of supplementary feeding:

Experiment 1: Forty pregnant ewes between 3-5 years of the age were selected from the Dhulli area and were divided into four equal groups; namely A, B, C and D.

Experiment 2: Twenty four ewes with lambs were selected from the same site and divided into similar groups.

Experiment 3: Twenty four does that were pregnant and with kids were selected and divided into same four groups from Dhulli site and also from another site namely, Begal.

All flocks were ear tagged, vaccinated against enterotoxaemia and recorded initial live-weight. Three supplemental formulation based on locally available feed was prepared and offered to these animals as Ration I (16.5% CP; 72-75% TDN), II (17.0% CP; 75-80% TDN), and III (17.5% CP; 80-85% TDN), respectively at the rate of 500 grams/head/day for 90 days and green fodder fed comprised of Maize, Lucerne and Oat in a 50:50 ratio to first three groups and last group kept as farmers practices. Body weight data (dam on monthly basis for three months, lamb/kid at birth and weaning weight), lamb/kid birth ratio, survival/mortality were collected for comparison of different feed formulation, at two ecological sites and conventional farming practices. The data was analyzed using Statistix 8.1 computer statistical package. The Split Plot Design followed by LSD were applied for comparative impacts and significant difference among the groups fed with the three feed formulations.

Results and Discussion

Study 1: Assessment and recommendation of fodder production systems in Chakwal

Two fodder production seasons can be observed in Chakwal, namely winter fodder (berseem, barley, mustard, oats) available from October to April and summer fodders (cluster beans, maize, millet, sorghum) available from May to September. In addition, alfalfa as perennial fodder is produced in this area. Rain-fed and irrigated fodder production practices are practiced at both sites in Chakwal. In addition to fodder, the farmers also offer crop residues during the different seasons according to availability. According to farmer's perceptions, rain-fed fodders are available round the year except November, December and January. While irrigated fodders are available in different crop rotations during the whole year. It seems that



the problem is not the potential for fodder production in the different seasons; rather it is the quantity of fodder produced. In present study, the higher production of fodder for autumn/winter management was from SS Hybrid (Sorghum Sudan Grass), NARC-Oat, mix fodder (Oat, Gram and Brassica; Guar, Sorghum and millet) while alfalfa and maize for summer scarcity.

Farmers have to face scarcity of green fodder during mid-November to mid-January. To fill this gap, NARC introduced NARC-Oat a new high yielding, tall, broad leaved, late fodder variety permitted by the Punjab Seed Council in 2011, for general cultivation in the rainfed areas of Potohar and irrigated areas of Pakistan (Naheed, 2014). Sorghum hybrid has been grown in the country since mid-seventies, but recently it has gained more importance among the farmers due to its multi-cut nature, high fodder yield potential and availability of green fodder during scarcity periods.

Based on the information collected from farmers and that available in literature, seasonal calendars for fodder production were prepared based on farmers' perception for the two study sites (Dhulli and Begal).

Study 2: Impact of supplemental feeding to small ruminants for improved productivity

The ewes/does (mostly pregnant) showed increase of above three kg live-weight gain in three months feeding supplements while there was only 1.2-1.3 kg increase in grazing based animals. There is no significant difference among the supplemental fed groups however significant difference between supplemental fed and grazing groups. All the groups showed increase in live-weight gain throughout 90 days experiment. The ewes/does just after lambing/kidding showed temporary drop in live-weight but regain within few days.

The lambing/kidding (80-90%) in almost all the groups were found satisfactory but these were the results of confirmed pregnant animals. While in each flocks almost 50% ewes/does were dry due to un-controlled breeding practices. These dry animals might conceive in other time period of the year. According to farmer's perceptions overall lambing/kidding on annual basis were ranged between 70-80%. In case of lamb/kid mortality only one kid was died in group D of does due to some un-identified disease and rest of the newly born survived. The newly born lambs/kids from all the fed groups showed higher but non-significant difference of weight than grazed animals. However there is significant difference of weaning weight among all the supplemental fed dams compared with grazed only (Table 1).

The sheep and goats become sexually active in response to decreasing day length in the late summer to early autumn (Bryant, 2003). The breeding started in September/October and ends with lambing/Kidding in March/April. The supplemental feeding is recommended before the breeding, during gestation and also just after lambing/kidding (Ankur, 2003). The supplemental feeding of concentrates (10.8 MJ and CP content of 170 g per kg DM) compared with grazing only improved certain reproductive parameters such as gestation weight (22.0 vs 4.76 g/d) and lamb/kid birth weight (1.15-1.45 vs 0.8-1 kg) in sheep and goats under grazing system in Bangladesh (Salim et al., 2002). The similar trend of live-weight gains were also recorded in present study. However, Kabir et al., (2004) concluded that high protein diet did not significantly ($p>0.05$) increase live weight gain (33.0 vs 25.2 g/d) in goats. In contrast, sheep fed high protein diet significantly ($p<0.05$, $p<0.01$) improved DM intake and live weight gain compared to those fed low protein diet. These results indicate that supplementary feeding of high protein diet (208g CP per kg DM) significantly increased growth performance of sheep under grazing condition.

The ewes/does with lambs/kids also fed with three supplemental rations showed significant higher weight gain than ewes purely based on grazing only



Table 1. Impact of supplemental feeding on growth and production of small ruminants

Animal	Group	Ewes/does			Lambs/kids		
		Initial Wt.	3-M Wt.	Difference (Kg)	Lambing (%)	Birth Wt (Kg)	Weaning Wt (Kg)
Ewes	A	52.4±2.1	56±1.9	3.6	90	3.57±0.1	18.22±1.4
	B	50.3±2.4	54.1±2.6	3.8	90	3.66±0.2	17.44±1.1
	C	57.8±2.6	61.5±2.2	3.7	80	3.75±0.1	16.12±1.1
	D	53.3±3.2	54.6±3.2	1.3	90	3.05±0.2	15.66±0.9
Does	A	40.7±1.6	43.9±1.6	3.2	80	2.18±0.2	13.62±0.6
	B	54±3.9	57.4±4.1	3.4	90	2.26±0.2	13±0.4
	C	47.5±3.6	50.7±3.8	3.2	90	2.88±0.3	12.66±0.4
	D	49.5±1.1	50.7±1.3	1.2	80	2.81±0.1	10.75±1.6

M= Month, Wt= Live-weight (Kg)

References

- Ankur, R., D. Narayan, and K. Sharma. 2003. Effect of Strategic Feed Supplementation during Gestation on Intake, Blood-biochemical Profile and Reproductive Performance of Goats. *Asian-Aust. J. Anim. Sci.* 12: 1725-1731.
- Bryant, M. J. 2003. Review Seasonality of reproduction in sheep. *Small Ruminant Research.* 48: 155-171.
- Kabir, F., M. S. Sultana, M. Shahjalal, M. J. Khan, and M. Z. Alam. 2004. Effect of protein supplementation on growth performance in female goats and sheep under grazing condition. *Pakistan Journal of Nutrition.* 3(4): 237-239.
- Mahajan, J. M., D. S. Chauhan, and V. P. S. Tomar. 1976. Effect of supplementary feeding to grazing on growth and wool production in sheep. *Indian J. Anim. Res.* 10: 90-92.
- Nasrullah, M. A., M. A. Kakar, J. Sales, I. B. Marghazani, A. N. Khosa, M. Fiaz, M. H. Kakar, M. Rekik, N. Lassoued, H. Ben Salem, and M. Mahouachi. 2007. Interactions between nutrition and reproduction in sheep and goats with particular reference to the use of alternative feed sources. *Options Méditerranéennes: Série A. Séminaires Méditerranéens*; n. 74 (375-383) (<http://om.ciheam.org/article.php?IDPDF=800404>).
- Salim, H. M., M. Shahjalal, A. M. M. Tareque, and F. Kabir. 2002. Effects of Concentrate Supplementation on Growth and Reproductive Performance of Female Sheep and Goats under Grazing Condition. *Pakistan Journal of Nutrition* 1(4): 191-193.