



*Original Research*

## Supplementary Feeding of Goats during Transition Period: A Participatory Action Research in North-Eastern Transition Zone of Karnataka State, India

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### Abstract

Supplementary feeding of goats during transition period is the major drive for improving the productivity through reproductive performance of goats. In this context, a participatory action oriented approach was followed in purposively selected Karnataka Watershed Development Department (KWDP)-Sujala-III project villages since this project is implemented in this district by Veterinary College, Bidar. About 220 goat rearing households were contacted for this activity, out of which a total of 96 does from 16 respondents were selected with same stage of pregnancy and body condition score. The project clearly revealed that an integrated approach of extension activities viz. training, demonstration, on-farm testing, farm literature etc. has achieved the expected target and has convincingly demonstrated the importance of supplementary feeding of goats during transition period. There is an increase in income generation through improved kidding percentage, kid birth weight, kid growth, doe health condition, multiple births etc. Further, the authors have observed decrease in economic losses due to kid mortality and problems during kidding. The project has also witnessed the convergence of multi-stakeholders for achieving a common objective of improving productivity and hence, this experience of convergence can be applied at a larger scale.

**Key words:** Participatory Research, Supplementary Feeding, Sujala Project, Transition Period

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### Introduction

The productivity of goats under the prevailing traditional production system is very low (Singh and Kumar, 2007), since they are maintained under the extensive system on natural vegetation on degraded common



grazing lands and tree lopping. Moreover, adoption of improved production technologies/ management practices in the farmers' flock is very low (Tekale *et al.*, 2013; Rathod *et al.*, 2014). Further, adoption of scientific technologies or practices for improving the production and also to meet the increasing demand in the domestic as well as international markets is very essential. In this context, various attempts are made to introduce scientific and superior technologies for mass adoption and create necessary facilities for adoption of improved management practices in goat keeping. Further, implementation of any improved scientific practices and its adoption in practical field conditions depends on various factors and adoption behaviour of the individuals. Among various issues, supplementary feeding of goats during transition period is the major drive for improving the productivity through reproductive performance of goats (Kulkarni *et al.*, 2014). It helps in improving the kidding rate, weaning rate, kidding interval, live weight of kids born or weaned, milk yield of does (goat mother), health status of doe and kids etc.

### **Supplementary Feeding of Goats during Transition Period**

With the time between weaning and mating, ewes should nutritionally replenish losses from the previous kidding. It is advisable to increase level of nutrition before and after mating, resulting in higher ovulation and conception rates and make provision for the additional nutritional needs in late pregnancy and early lactation. The transition period is considered by many nutritionists and academicians as the time period of late pregnancy to very early lactation. It is often a varying period, which depends on the species of livestock. However, the authors have followed 60 days pre-kidding to 30 days post-kidding period. Over this very short period, the animal is forced to deal with radical changes such as: difficulties of gestation, parturition, onset of lactation, appetite fluctuations (from a gestation diet to a lactation diet), and fluctuations in hormone levels. The critical points to remember are nutrient compositions and feed formulation of supplementary feed (concentrate mixture) used for feeding. Approximately the concentrate mixture consists of 15% crude protein (CP) and 65% total digestible nutrients (TDN) as per book values which can be prepared using the ingredients like maize (30 %), ground nut cake (5 %), soya bean (5 %), green gram chuni (10 %), rice polish (5 %), wheat bran (40 %), limestone (2 %), mineral mixture (1%) and salt (2 %). The supplementary feeding composition can be varied depending on the availability of inputs and socio-economic status of the farmers at field conditions.

Considering the vitality of above stated facts, the authors therefore emphasized on supplementary feeding of goats during transition period for improving productivity and focused on adoption and diffusion of scientific practices for the benefit of other farmers in the project villages. Further, this project has also addressed the challenges faced by the project staff and the farmers in this particular project activity.

## Materials and Methods

The study adopted a participatory action oriented approach in the project villages of the World Bank-funded, Karnataka Watershed Development Department (KWDP)-sponsored Sujala-III project implemented by Veterinary College, Bidar which is under the aegis of the Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU), Bidar (Karnataka) from December 2014. However, this particular activity was undertaken during the year 2016-17. Purposive sampling technique was used for selecting Bidar district since Sujala-III project was implemented in this district by Veterinary College, Bidar. Further, a total of 14 project villages identified by Government of Karnataka (India) in two blocks were identified for the study. All these villages fall under North-Eastern Transition Zone of Karnataka State with a location of 17.9074° N (Latitude) and 77.5271° E (Longitude) and elevation of 710 m above sea level. About 220 goat rearing households were contacted for this activity, out of which a total of 96 does from 16 respondents were selected considering the fact that each farmer had at least five goats and further, these goats were almost in the same stage of pregnancy and body condition score.

## Supplementary Feeding and Grouping of the Goats for Supplementary Feeding Trial

Supplementary feeding was carried out in pregnant does, maintained under a smallholder farming systems; with an aim to change the farmer's perception towards supplementary feeding during transition period and to disseminate and persuade the scientific practice among the whole community (Table 1).

**Table 1:** Nutrient composition and feed formulation of supplementary feed (concentrate mixture) followed in the study

S. No.	Ingredients	Quantity for 100 kg	CP %	TDN %
1	Maize	30	10	78
2	Ground nut Cake	5	40	75
3	Soya bean	5	41.6	75
4	Green gram chuni	10	18.8	56.2
5	Rice polish	5	12	78.5
6	Wheat bran	40	14	65
7	Limestone	2	-	-
8	Mineral mixture	1	-	-
9	Salt	2	-	-
<b>Total</b>		<b>100</b>	<b>14.76</b>	<b>66.27</b>

Approximately the supplementary feed (concentrate mixture) consisted of 15% CP and 65% TDN as per book values.

The goats were managed by the farmers according to their farm practice. All the selected does were grazed for 6-8 hours daily on range grasses and browses. However, supplementary (concentrate) feeding was not a common practice. A total of 96 pregnant does were selected which were in the similar stage of pregnancy, and body condition score were grouped into three categories as depicted in Table 2.

**Table 2:** Grouping of does under different treatment groups with respect to supplementation

Treatment Groups	No. of Does	Treatment/Supplementation
Control Group (C )	32	No supplementation in last 45 days of gestation period and 45 after kidding
Pregnancy Group (P)	32	Concentrate feed of 250g/day supplementation during last 45 days gestation period and no supplementation after kidding
Pregnancy+ After Kidding (AK)	32	Concentrate feed of 250g/day supplementation during last 45 days gestation period and also 45 days supplementation after kidding

### Assessment of Goat Farmer's Perception and Data Collection

The adoption of supplementary feeding during transition period and the perception of farmers was assessed using pretested semi-structured interview schedule by personal interview method, participant observation method and focused group discussion. Further, the parameters considered for this study included doe body weight, body condition score, change in conception levels, kidding levels, kid birth weight, kid mortality, twinning percentage, mothering ability and economic feasibility of supplementary feeding. The data was collected over a period of six months after an initial acclimatization period of two weeks. Field visits were carried out once in two weeks to monitor different parameters as discussed. The net income of this activity was calculated by considering different inputs and outputs of the study. However, economics of dead does, does which did not conceive and aborted were not considered in this particular study.

### Statistical Analysis

The data analysis was carried out using simple statistical tools like mean and percentage and the results were interpreted accordingly.

### Results and Discussion

#### Knowledge Level of Farmers about of Goat Feeding Management Practices

The data presented in Table 3 reveals the knowledge level of respondents about different scientific goat feeding practices. However, it was found that the knowledge level of respondents improved at the end of the study due to the efforts of project in the villages. Further, among various practices, proper time of colostrum feeding and its importance, proper stage to start green fodder to kid and per day requirement of concentrate feed to pregnant doe were the practices well known to the respondents compared to other practices. Almost similar findings were reported by (Tekale *et al.*, 2013) in the farmers' flock.

**Table 3:** Distribution of goat keepers according to knowledge level of goat feeding management practices (N=16)

S. No.	Recommended Practices	Knowledge Level/Awareness About Practices			
		Being Aware			
		( Before the Study)		( After the Study)	
		f	P	f	P
1	Proper time of colostrum feeding and its importance	11	68.75	16	100
2	Proper stage to start green fodder to kid	10	62.5	15	93.75
3	Milk requirement to new born kid according to their body weight	9	56.25	14	87.5
4	Per day requirement of green fodder to doe	8	50	14	87.5
5	Per day requirement of concentrate feed to doe	9	56.25	15	93.75
6	Per day requirement of concentrate feed to pregnant doe	10	62.5	14	87.5
7	Special care for milking doe	9	56.25	15	93.75
8	Method of giving mineral mixture	8	50	13	81.25
9	Type of special feed after kidding	7	43.75	12	75
10	Per day requirement of green fodder to buck	6	37.5	14	87.5
11	Per day requirement of concentrate feed to buck	6	37.5	13	81.25
12	Type of special feed to buck during breeding period	5	31.25	12	75

(f- Frequency; p- Percentage)

### Effect of Supplementary Feeding on the Performance of Goats

It was found from the Table 4 that there was 100% kidding in all the groups, while performance of AK group does was better as compared to other groups with regards to twinning and triplets and reduced mortality of kids.

**Table 4:** Effect of supplementary feeding on the performance of goats

Treatment Group	C Group	P Group	AK Group
Total number of does selected	32	32	32
Total does giving birth to live kids	32	32	32
Kidding percentage	100	100	100
Total does with single kid	12 (37.5 %)	8 (25%)	4 (12.5 %)
Total does with two kid	20 (62.5%)	18 (56.25%)	20 (62.5%)
Total does with three kid	0 (0%)	6 (18.75%)	8 (25.0%)
Total kids born	30	62	72
Total death of the kids	8	4	2
Total kids alive	22	58	70
Mortality %	26.66	6.45	2.77
Mean birth weight of kids (kg)	1.58	1.84	1.96
Mean kid weight at 30 days after birth (kg)	2.08	2.76	3.02
Mean kid weight at 45 days after birth (kg)	2.95	4.05	4.892
Mean body condition score of does	2.02	2.16	2.28

Further, Table 4 also indicates that mean birth weight of kids (kg), mean kid weight at 30 days after birth (kg), mean kid weight at 30 days after birth (kg) and mean body condition score of does was highest in AK group as compared to other two groups. Almost similar findings were reported by Kulkarni *et al.* (2014) and Kerketta *et al.* (2017) at field conditions.

### Economic Analysis of Supplementary Feeding in Goats

Table 5 reveals that the net profit obtained per doe per day under AK group was higher than that of C group and P group. However, the net income/doe depicted in the Table 5 is the additional benefit derived from each doe excluding the actual rate of doe in market observed in the traditional or conventional methods. The study conducted by Kulkarni *et al.* (2014) also revealed similar findings.

**Table 5:** Economic analysis of supplementary feeding in goats

Particulars	C group	P group	AK group
Total No. of does	32	32	32
Total does giving birth to live kids	32	32	32
No. of days of supplementation	--	48	104
Supplementary feed required (per day)	--	8 kg	8 kg
Cost of supplementation (Rs)	--	7,680	16,640
Total kids born	30	62	72
Total kids remaining	22	58	70
Income from sale of kids	26,400	69,600	84,000
Gross income/doe (Rs)	825	2175	2625
Other management cost/doe/month (Rs)	150	150	150
Net income/doe (Rs)	675	2025	2475

**Note:** 1. Cost of supplementary feed-Rs. 20/kg;

2. Sale of kid at 1 month of age @ Rs. 1200/kid

3. Other management cost includes the labour cost and cost of veterinary aid.

4. Net income/doe is the additional benefit derived from each doe excluding the actual rate of doe in market

### Goat Reares's Perception towards Supplementary Feeding in Goats

The perception of the goat rearers towards supplementary feeding has been presented in Table 6. The respondents perceived that body weight after supplementation, body condition score (BCS), health status, kidding percentage, kid birth weight, doe milk production were highest in AK group due to supplementary feeding in goats. Further, the respondents also responded that supplementary feeding was economically feasible and hence, the farmers would adopt the practice in future for improvement in their socio-economic status.

**Table 6:** Perception of respondents towards supplementary feeding (N=16)

Item	AK is better		P is better		No change	
	f	%	f	%	f	%
Perception over improved body weight after supplementation	15	93.75	11	68.75	8	50
Perception over improved Body Condition Score (BCS)	14	87.5	10	62.5	6	37.5
Perception over improved health status	14	87.5	10	62.5	7	43.75
Perception over kidding percentage	16	100	13	81.25	7	43.75
Perception over abortion levels (Decrease/ No Change)	13	81.25	9	56.25	5	31.25
Perception over kid birth weight and activity (Increase/ No Change)	15	93.75	12	75	7	43.75
Perception over doe milk production (Increase/ No Change)	14	87.5	10	62.5	7	43.75
Perception over multiple births (Increase/ No Change)	16	100	13	81.25	7	43.75
Perception over kid mortality (Decrease/ No Change)	14	87.5	10	62.5	6	37.5
Adoption of the practice in future by respondents (Yes/No)	15	93.75	10	62.5	6	37.5
Economic feasibility of the practice as perceived by the respondents (Yes/No)	14	87.5	11	68.75	8	50
Improvement in the socio-economic status due to adoption of the practice (Improved/ No change)	15	93.75	11	68.75	7	43.75

(Multiple responses of respondents was noted in the study)

### Convergence of Multiple Stakeholders/Actors

Multifarious agencies such as the World Bank; Karnataka Watershed Development Department; Veterinary College, Bidar; Livestock Research and Information Centre (Deoni), Bidar, under Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar; State Department of Animal Husbandry and Veterinary Services and individual farmers were involved in the project. The animal nutrition experts and management experts of veterinary college, Bidar technically assisted the project staff in preparation of supplementary feed and scientific goat management practices. The field veterinarian in the project area assisted the project team in identification of pregnant does and also helped in carrying out deworming and vaccination of goats. Animal health problems or diseases were treated by project staff with the help of veterinarians at the earliest to prevent economic losses and followed up with post treatment also.

### Challenges Faced

During the initial phase, this project faced various problems and challenges since the project beneficiaries were not aware about the importance of supplementary feeding and hence, realized the importance of this practice very late. The project team also made efforts to motivate the beneficiaries, strengthen their scientific knowledge and make them adopt scientific practices in the form of supplementary feeding, deworming, vaccination etc. Although farmers were informed about the objective of the activity, they required regular follow-up visits and field-level observations with regards to scientific feeding, weighing, advisory services etc. The beneficiaries also responded that it was highly expensive to purchase

supplementary feed from market, and hence, they have realized the importance of supplementary feed preparation using the locally available resources or inputs.

### **Conclusion and Policy Implications**

The project clearly revealed that an integrated approach of extension activities viz. training, demonstration, on-farm testing, farm literature etc. can promote adoption of scientific practices by sensitisation and improving the knowledge level of farmers. The programme has achieved the expected target and has convincingly demonstrated the importance of supplementary feeding of goats during transition period. There is an increase in income generation through improved kidding percentage, kid birth weight, kid growth, doe health condition, multiple births etc. Further, the authors have observed decrease in economic losses due to kid mortality and problems during kidding. The project initiative was also found to be unique since it has witnessed the convergence of multi-stakeholders for achieving a common objective of improving productivity and hence, this experience of convergence can be applied at a larger scale. This practice is likely to continue even after the termination of the project as farmers currently have adequate knowledge and a positive attitude towards this scientific practice with very negligible financial and technical support from the government.

- a) There is a need to focus on promotion of supplementary feed preparation using region-specific and locally available inputs or resources so that farmers can prepare on their own with low investment. On the same lines, commercialisation or entrepreneurship in supplementary feed preparation can also be developed to meet feed and fodder requirements in the project area.
- b) Although this project has achieved success to some extent, there is a need to emphasise on supplementary feed production to a larger extent by supporting farmers through inputs delivery and need-based extension approaches, since farmers have limited understanding about its production and its importance.
- c) Nearby farmers have also made an attempt to contact the concerned farmers or institutions to adopt this practice since it is essential for enhancing profits in goat farming. Further, this interest of farmers and adoption of supplementary feeding practice is expected to continue even after the completion of this particular project in the project villages.
- d) Training, demonstration and field visits of field staff and other stakeholders must be taken-up on timely basis to update their knowledge and carry out further dissemination to farming community.

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