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Original Research Article

Impact of Technical Interventions of KVK, Kalyandurg on Livestock Production and Profitability of Dryland Farmers in Ananthapur District of Andhra Pradesh

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A B S T R A C T

Anantapur is a hot and arid district, falls in rain shadow zone with a very low annual rainfall of 520 mm which is the second lowest in the country after Jaisalmer in Rajasthan (Raghu and Reddy, 2011). Monsoon evades Anantapur district due to its location in the rain shadow region. South-West monsoon is prevented by the high altitudes of Western Ghats, making Anantapur District a rain shadow area and hence, agricultural conditions are more often precarious. The recurrence of droughts increased considerably and unless collective measures are initiated on a permanent basis the situation will become grim in future. Of the 133 years of record i.e., from 1876-1877 to 2008-09, 66 years were drought years (ICAR Expert team report -2012). On-Farm Testings were conducted to popularize the latest technologies in livestock among the farmers under the supervision of KVK Kalyandurg for three years 2014-15 to 2016-17. The comparison was made between farmers' practice of traditional rearing method of livestock with latest technical interventions. In case of fodder yields CO-3 (trial plot) has recorded highest fodder yield (126.5 t/ha) compared to farmers' practice (101.8 t/ha) which was 24.45 per cent higher. Similarly due to use of Regional Specific Mineral Mixture (RSMM) milk yield has improved from 356 lit/animal to 428.4 lit/animal. Further due to use of salt lick, azolla the body weights of the rams have shown 14 to 21 percent improvement. Due to practicing of IFS the net income has improve around 18 percent despite of severe drought conditions in dryland agriculture.

Keywords

Regional Specific Mineral Mixture, Azolla, Salt licks, IFS, urea treated paddy straw, fodder, production and profitablity

Introduction

As per the livestock population 2012 census there are 6.17 lakh cattle, 3.71 lakh buffaloes, 38.79 lakh sheep, 7.85 lakh goat, 0.21 lakh pigs and 15.89 lakh poultry population in the district. This district is producing on an average 3.55 lakh Metric Tonnes of milk, 247.53 lakh Metric tonnes of meat and 5611 lakh eggs per year. Average milk production in Non-Descript cow is 1.7 lit, Cross Bred cow is 7.1 lit and in buffalo it is 3.9 lit. Average egg production in Desi fowl is 60-70 eggs, in improved poultry birds it is 140-160 eggs, in layers it is 240-260 eggs and in ducks it is 40-60 eggs per year (Socio Economic survey of Andhra Pradesh-2016-17). Fodder requirement in the district is 8.03 lakh tonnes per year but the production is 3.01

lakh tonnes leaving the deficit of 5.02 lakh tonnes which is highest in the state. Milk production in the district is 16.8 lakh lit/month against procurement target 30 lakh lit/month leaving 23.2 lakh liters shortage due to fodder deficit (Eenadu daily newspaper, Anantapur dt. 11.08.2015, Page.no.8). With an object to improve the production and profitability of dryland livestock farmers KVK, Kalyandurg has taken up the following initiatives in the form of On Farm Testing (OFT) and Frontline Demonstrations (FLDs) in adopted villages of KVK from 2014-15 to 2016-17 for 3 consecutive years.

Materials and Methods

Krishi Vigyan Kendra, Kalyandurg, has introduced 2 On Farm Testings viz Regional Specific Mineral Mixture to improve production in dairy animals, Introduction and assessment of improved fodder varieties to meet fodder deficit and 4 Front Line Demonstrations viz Promotion of Integrated Farming system – Crop + Livestock + Poultry, Mitigation of mineral deficiency in ramlamb by using salt licks, effect of Azolla feeding on growth rates of Ramlamb, effect of Urea treated paddy straw on production parameters of dairy animals, under real farming situations between 2014 and 2017 in eleven different villages located in different blocks under KVK operational area. Exploratory research design was used for the study as it was initial attempt covering all the aspects of production, productivity, profitability and benefit cost ratio in the western mandals of Anantapur district. Total population in whose plots OFTs were conducted along with control plot was taken into consideration for the study to find out production and other economic parameters of farmers. Data on yields, production, productivity, profitability, expenditure incurred were collected from control (Farmer's practice) and trial plots and cost of cultivation, cost savings, additional returns, net income and benefit cost ratio were computed and analyzed. Gross income was calculated based on local market prices of the item and net income by subtracting the total cost of cultivation from gross income. Benefit: cost ratio was computed by dividing gross returns with cost of cultivation. To compare the significance of mean scores of crucial parameters yields, production and productivity, 't'- test or 'z'-test was administered between trial and control plots based on relevance.

Results and Discussion

The results obtained from the present investigation as well as relevant discussions have been summarized under the following heads.

Effect of regional specific mineral mixture on productive and reproductive parameters of dairy animals

A large number of livestock in the tropics suffer from deficiencies or imbalances in mineral nutrition. Livestock is mainly maintained on grazing without access to mineral supplement. Dietary deficiencies result in failure of the mineral homeostasis mechanism affecting the productive and reproductive potential of the animal. The present demonstration was conducted to study the effect of supplementation of specific deficient minerals in the form of regional specific mineral mixture (RSMM) in dairy animals maintained under a semi-intensive management system in Anantapur district of Andhra Pradesh State, India, for three years under field conditions.

Regional specific mineral mixture containing elements like calcium (18%),

zinc (0.54%), copper (0.22%), phosphorous (9%), manganese (0.29%), sodium chloride (25%) and moisture(5%) was supplied to the animal@80 gm/day and the observations on milk production, animals exhibiting heat symptoms at right time were recorded and presented in the following table.

Due to use of RSMM in dairy animals for 90 days the average milk yield was improved from 352.5 lit/animal to 434.7 lit/animal and of 34 animals 24 animals were exhibited heat symptoms in right time compared to 11 animals in control.

In order to test the effectiveness of RSMM statistically 'z' test was applied to find out, whether there is any significant difference existed between the demonstration and control in terms of milk yield and heat symptoms exhibited by animals and presented in Table.3

The perusal of Table-3 clearly revealed that there was significant difference between milk yield ($p < 0.01$) and heat symptoms exhibited by animals ($p < 0.01$) between demonstration and control. These results are in line with the findings of Prasad, C.S. and Gowda, N.K.S. (2007) and Devasena, B. *et al.,* (2010).

Introduction and assessment of improved fodder varieties to meet fodder deficit

As per the socio economic survey of Andhra Pradesh (2015-16) there are 8.96 livestock units in the district with an annual fodder requirement of 8.03 lakk tonnes. But as against the requirement, merely 3.01 lakh tonnes of fodder is available leaving 5.02 lakh tonnes deficit in the district which is causing obstacle to dairy production and growth of livestock population. To overcome this problem high yielding, drought tolerant/resistant improved hybrid Napier fodder varieties were introduced by KVK, Kalyandurg as front line demonstration in adopted villages whose details are as follows.

Hybrid Napier variety CO-3 is a high yielding perennial fodder grass developed by the Tamil Nadu Agricultural University, Coimbatoor, India. This grass is propagated through root-slips or stem-cuttings and could be maintained as a perennial crop up to 4 - 5 years. Endowed with quick regeneration capacity, it can be harvested once in 30 - 45 days. Proper management practice together with correct application of fertilizer, irrigation in drought spells, cutting at the suitable height and interval is essential for maximum profit and persistence of the crop. KVK, Kalyandurg had introduced this fodder variety in 2014-15 in an area of 3 ha. In adopted villages and the observations on fodder yield and milk production, were recorded and presented in the following table.

In order to test the effectiveness of CO-3, 't' test was applied to find out, whether there is any significant difference existed between the demonstration and control in terms of fodder yield and milk yield and presented in Table.6

The examination of Table-6 clearly revealed that there was significant difference between fodder yeild ($p < 0.01$) and milk yield ($p < 0.05$) between demonstration and control. These results are in line with the findings of Jagadamba *et al.,* (2010), Premaratne and premalal (2006) who were also reported higher yields in CO-3 in their studies on nutritional evaluation of perennial fodder varieties suitable for low irrigation input areas and hybrid napier (Pennisetum Perpureum x Pennisetum Americarnum) var. CO-3: a resourceful fodder grass for dairy development in Sri Lanka respectively.

Table.1 Particulars of On-Farm Testing

(N=34)

S.no.	Year	No.of villages	No.of locations	Dairy animals covered (ha)	
				Trial	control
1	2014-15	3	5	10	10
2	2015-16	3	6	12	12
3	2016-17	3	6	12	12
	Total	9	17	34	34

Table.2 Milk yield and heat symptoms exhibited by dairy animals due to supplementation of RSMM

Particulars	Milk yield in 90 days (lit/animal)			Animals exhibited heat symptoms (Number)		
	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
Open garazing + Feeding of RSMM @ 80g/day	431.4	444.4	428.5	6/10	9/12	10/12
Farmers practice (open grazing without RSMM)	353.5	357.9	346.1	2/10	4/12	5/12
% increase	18.0	19.4	19.2	-	-	-

Table.3 Significant difference between milk yield and heat symptoms exhibited by animals in demonstration over control for three years (2014 to 2016)

(N-34)

S.no.	Components	Mean yield		Mean difference	'z' – cal value
		Trial	Control		
1	Milk yields (Lit/animal)	434.7	352.5	82.2	13.59**
2	Heat symptoms exhibited (No./season)	5	8.3	3.66	2.29**

**significant at 0.01 level of probability *significant at 0.05 level of probability

**0.01 'z' - critical value – 1.95 *0.05 'z' - critical value – 1.64

Table.4 Particulars of On-Farm Testing

S.no.	Year	No. of villages	No. of locations	Area (ha)	
				Trial	control
1	2014-15	3	3	1.2	1.2
2	2015-16	4	4	1.6	1.6
3	2016-17	5	8	3.2	3.2
	Total	12	12	6.0	6.0

Table.5 Fodder yield and milk yield of dairy animals due to feeding of hybrid napier

Year	Fodder yield (t/ha)		Palatability		Milk yield (lit/day)	
	CO-3 (Trial)	CO-1 (Control)	CO-1 (Trial)	CO-3 (Control)	CO-1 (Trial)	CO-3 (Control)
2014-15	118.5 t/ha	101.5 t/ha	Low	High	4.5	6.8
2015-16	125.5 t/ha	111.5 t/ha	Low	High	5.1	6.4
2016-17	135.5 t/ha	92.5 t/ha	Low	high	4.8	7.2

Table.6 Significant difference between fodder yield and milk yield in trial over control for three years (2014 to 2016)

(N-12)

S.no.	Components	Mean yield		Mean difference	't' – cal value
		Trial	Control		
1	fodder yields (t/ha)	126.5	101.8	24.7	3.19**
2	Milk Yield (lit/animal)	4.8	6.8	2.0	1.87*

**significant at 0.01 level of probability *significant at 0.05 level of probability
**0.01 't' - critical value – 2.04 *0.05 't' - critical value – 1.69

Table.7 Particulars of Front line demonstrations

(N=21)

S.no.	Year	No. of villages	No. of locations	Area (ha)	
				Trial	control
1	2014-15	3	6	6	6
2	2015-16	5	10	10	10
3	2016-17	5	5	5	5
	Total	12	21	21	21

Table.8 Milk yield and heat symptoms exhibited by dairy animals due to supplementation of RSMM

Year	Treatment	Gross Expenditure (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	Man days
2014-15	Groundnut alone	22,875	27,224	4,349	1.19:1	120
	IFS - Groundnut + Ramlamb stall feeding (1unit=2) + back yard poultry with Rajasri birds(1 unit=10 birds)	35,614	46,538	10,924 (Rs.4,218/ from rams + Rs.2,357 from poultry)	1.30:1	275
2015-16	Groundnut alone	22,675	28,354	5,679	1.25:1	120
	IFS-Groundnut + Ramlamb stall feeding (1unit=2) + back yard poultry with Rajasri birds(1 unit=10 birds)	34,566	49,512	14,964 (Rs.4,646/ from rams + Rs.4,639 from poultry)	1.43:1	275
2016-17	Groundnut alone	14,975	15,760	785	1.05:1	120
	IFS-Groundnut + Ramlamb stall feeding (1unit=2) + back yard poultry with Rajasri birds(1 unit=10 birds)	21,675	32,543	10,868 (Rs.6,312/ from rams + Rs.3,771 from poultry)	1.50:1	275

Table.9 Particulars of Front line demonstrations

(N=86)

S.no.	Year	No.of villages	No.of locations	No.of Rams covered	
				Trial	control
1	2014-15	5	10	20	20
2	2015-16	6	12	24	24
3	2016-17	8	16	32	32
	Total	19	38	86	86

Table.10 Weight gain of ramlamb due to use of salt lick

Year	Initial weight (kg/ram)		Final weight (kg/ram/90 days)		Net weight gain in Trial (Kg/ram)	% improvement in Trial
	Trial	Control	Trial	Control		
2014-15	9.8	10.0	22.4	18.9	3.5	18.5
2015-16	8.9	10.1	27.3	23.9	3.4	13.9
2016-17	8.3	9.5	26.8	24.3	2.5	10.2

Trial – Open grazing + salt lick supplementation Control – Open grazing without salt lick

Table.11 Significant difference between body weights of rams in trial over control for three years (2014 to 2017)

(N-86)

S.no.	Components	Mean yield		Mean difference	'z' – cal value
		Trial	Control		
1	Weight gain (kg/ram)	25.5	22.3	2.2	1.81*

**significant at 0.01 level of probability *significant at 0.05 level of probability
**0.01 'z' - critical value – 1.95 *0.05 'z' - critical value – 1.64

Table.12 Particulars of Front line demonstrations

(N=44)

S.no.	Year	No.of villages	No.of locations	No.of Rams covered	
				Trial	control
1	2014-15	3	6	12	12
2	2015-16	4	8	16	16
3	2016-17	4	8	16	16
	Total	11	22	44	44

Table.13 Weight gain of ramlamb due to use of azolla

Year	Initial weight (kg/ram)		Final weight (kg/ram/90 days)		Net weight gain in Trial (Kg/ram)	% improvement in Trial
	Trial	Control	Trial	Control		
2014-15	8.5	8.7	24.7	22.4	2.3	10.26
2015-16	9.8	9.5	30.1	24.9	5.2	20.08
2016-17	8.6	9.0	29.4	24.6	4.8	19.51

Table.14 Significant difference between body weights of rams in trial over control for three years (2014 to 2017)

(N-44)

S.no.	Components	Mean yield		Mean difference	'z' – cal value
		Trial	Control		
1	Weight gain (kg/ram)	28.0	23.9	4.1	4.23**

**significant at 0.01 level of probability *significant at 0.05 level of probability
**0.01 'z' - critical value – 1.95 *0.05 'z' - critical value – 1.64

Promotion of Integrated Farming system – Crop + Livestock + Poultry

IFS is judicious mix of one or more enterprises along with cropping having complimentary effect through effective recycling of wastes and crop residues and encompasses additional source of income to the farmer. In agriculture, crop production is the main activity. The income obtained from crops may hardly be sufficient to sustain the farm family throughout year. Assured regular cash flow is possible when the crop is combined with other enterprises. Judicious combination of enterprises, keeping in view of the environmental conditions of a locality will pay greater dividends. At the same time, it will also promote effective recycling of residues/wastes. With this concept IFS with three enterprises like crop + livestock + poultry were introduced and assessed their performance in terms of risk, gross income, net income, B: C ratio at field level with small and marginal farmers.

Though the Govrnment of Andhra Pradesh had declared Anantapur district in all the above years as drought affected, farmer could get higher returns in IFS compared to monocropping. Livestock and poultry components were integrated with crop farming to make use of resources effectively and efficiently to get additional returns to the farmers. In this process one unit of ramlamb (2 rams) and one unit of Rajasri backyard poultry birds (10 no.) were supplied to the farmers along with his routine practice of growing of groundnut alone in one hectare of land. It is evident from the Table 8 that in all the years because of integration of livestock component farmers could reap additional returns of Rs.6575/ha, Rs.9285/ha, Rs.10083/ha in 2014, 2015, and 2016 respectively. Enhancement of net income and man days due to use of IFS was also reported by Yadav, C.M. and Sharma, R.K. (2013), Desai, B.K. *et al.*, (2013), Roy, A. *et al.*, (2014) and Khan, N. *et al.*, (2015) in their studies conducted at various locations of India.

Mitigation of mineral deficiency in ramlamb by using salt licks

A large number of small ruminants in the tropics suffer from deficiencies or imbalances in mineral nutrition. Small ruminants mainly maintained on grazing without access to mineral supplement. Dietary deficiencies result in failure of the mineral homeostasis mechanism affecting the productive and reproductive potential of the animal. The present demonstration was conducted to study the effect of supplementation of salt licks in ramlamb maintained under a semi-intensive management system in Anantapur district of Andhra Pradesh State, India, for three years under field conditions.

Salt lick provide essential elements such as phosphorus and the biometals (sodium, calcium, iron, zinc, and trace elements) required for bone, muscle and other growth

was supplied to the animal and the observations on growth rates/body weights was recorded and presented in the following table.10

Due to use of Salt lick in dairy animals for 90 days the average weight was improved from 25.5 kg/Ram to 22.3 kg/Ram in control.

In order to test the effectiveness of salt lick statistically 'z' test was applied to find out, whether there is any significant difference existed between the demonstration and control in terms of weight gain and presented in Table.11

The perusal of Table-11 clearly revealed that there was significant difference between weight gain ($p < 0.05$) demonstration and control.

Effect of Azolla feeding in growth rates of ramlamb

Azolla is rich in protein, almost 25-30 % on dry weight basis; it is also found to contain essential minerals like Iron, Calcium, Magnesium, Phosphorus, Copper, Manganese etc apart from appreciable quantities of vitamins A and vitamins B12. The present demonstration was conducted to study the effect of supplementation of azolla in ramlamb maintained under a semi-intensive management system in Anantapur district of Andhra Pradesh State, India, for three years under field conditions.

A field trial was conducted to study the effect of feeding azolla on growth rates in growing rams for three years under field conditions.

Due to use of salt lick in dairy animals for 90 days the average weight was improved from 23.9 kg/Ram to 28.06 kg/Ram in control. In order to test the effectiveness of azolla statistically 'z' test was applied to find out, whether there is any significant difference existed between the demonstration and control in terms of weight gain and presented in Table.14

The perusal of Table-14 clearly revealed that there was significant difference between weight gain ($p < 0.01$) demonstration and control. These findings are in line with the findings of Ravindra Kumar *et al.,* (2017) were also reported increase in weight due to use of Azolla pellet in the diets of goat.

Due to technical interventions of the KVK in livestock and small ruminants, the productivity, yields, profitability and net returns to dryland small marginal farmers have clearly improved as it was evident from the findings in the above tables. Hence by adopting latest technologies like use of RSMM, improved fodder varieties, IFS systesm, salt licks and azolla production and profitability levels could be improved even in dryland farming systems.

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