

Performance of promising forage in eastern India and their nutritive value

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Introduction

Eastern region of India possesses large number of ruminant population (162 million) that depend on available feed resources (GOI, 2014). But, at the same time, an acute shortage of green fodder prevails in the eastern part of India that varies from 82 to 89 per cent. The main reason behind this gap is low land holding and negligible area under fodder production. Shortage of quality feed and fodder resources and neglect of forage crops led to decline in the productivity of Indian livestock. However, as a whole, country having 8.30 million ha area under fodder production (Anon, 2013) and out of this 4.90 million ha covered during Kharif season and 3.01 million ha utilized for fodder production during Rabi season. Therefore, considering the above problem, a study was conducted on fodder cum grain production to mitigate fodder scarcity problem in the eastern part of India.

Materials and Methods

The experiment was led down at ICAR Research Complex for Eastern Region Patna farm in the year 2014-15 having tropical agro-climate, clay-loam type soil and pH neutral to alkaline. Land was prepared and multicut sorghum (*var.* MP Chari) was sown in 2,100m² area during Kharif season and seven fodder crops viz. annual rye, berseem (*var.* Hybrid and Wardan), oat (*var.* Kent and JHO-822), wheat (*var.* VL-829) and maize hybrid were sown during Rabi season. Fodder and seed yield data were recorded for total biomass production. Fodder samples processed immediately for DM estimation just after harvesting and proximate principle was analyzed in dried and pooled samples as per the procedure (AOAC, 2005). Digestibility trials were conducted in crossbred heifers to study the nutritive value of forages. The individual forage was provided as sole feed after chaffing in cut and carry system to three cattle heifers for 21 days as adaptation period at different time as per forage availability and subsequently digestibility trial for the period of four days was conducted. A set of another digestion trial was also conducted in buffalo calves on berseem and oat fodders only to study the comparative nutritive values of these fodders in cow and buffalo calves. Compiled data were analyzed for test of significance as per standard methods (Snedecor and Cochran, 1994).

Results and Discussion

Multicut sorghum fodder yield is good during Kharif (rainy) season. Similarly, annual rye and berseem fodder yields recorded maximum during Rabi (winter) season with good amount of crude protein content (Table 1). Significantly higher dry matter intake (DMI) and crude protein digestibility (CPD) were recorded in cow heifers fed annual rye than sorghum, maize and oat, however, the values were comparable with wheat and berseem fodder (Table 2). Singh *et al.* (2009) also reported similar DM intake in heifers when fed maize fodder supplemented with concentrate feed. Maximum digestible crude protein (DCP) value was obtained in berseem fodder. The nutritive value of maize and sorghum forage in terms of DMI, CPD and DCP were recorded lowest and seems to be poor, hence supplementation of legume fodder is required for balance feeding.

The nutritive value of berseem and oat in cow and buffalo calves indicated that berseem forage had significantly ($P<0.01$) higher DMI, CPD and DCP value than oat forage. Similarly, the DMI, DMD, CPD and DCP values were significantly ($P<0.01$) higher in cow calves than buffalo calves.

Table 1. Fodder productivity and total biomass yield of different forage crops

Attributes	Cropping Period (d)	Fodder DM Yield (t/ha)	Av. Crude Fibre (g/100g DM)	Straw Yield (t/ha)	Seed Yield (t/ha)	Total DM Biomass Yield (t/ha)
Annual Rye						
Only Fodder (5 cuts)	140	11.97±0.18	17.12	--	--	11.97±0.18
Fodder (4 cuts) & seed	165	9.99±0.18	--	2.93±0.24	0.41±0.01	13.34±0.35
Berseem var. Hybrid						
Only Fodder (5 cuts)	165	8.78±0.01	19.27	--	--	8.78±0.01
Fodder (4 cuts) & seed	200	7.00±0.03	--	3.07±0.09	0.10±0.005	10.17±0.11
Berseem var. Wardan						
Only Fodder (5 cuts)	165	9.11±0.06	19.31	--	--	9.11±0.06
Fodder (4 cuts) & seed	200	7.10±0.08	--	3.57±0.09	0.30±0.01	10.96±0.14
Oat var. Kent						
Only Fodder (2 cuts)	105	4.34±0.13	11.00	--	--	4.34±0.13
Fodder one cut & seed	130	2.03±0.12	--	4.02±0.04	1.80±0.03	7.85±0.13
Oat var. JHO-822						
Only Fodder (2 cuts)	105	4.16±0.07	11.49	--	--	4.16±0.07
Fodder one cut & seed	150	1.90±0.11	--	3.94±0.05	1.75±0.03	7.59±0.14
Wheat var. VL-829						
Fodder one cut & seed	150	1.10±0.03	17.46	4.77±0.06	3.11±0.02	8.98±0.10
Seed only	150	--	--	4.54±0.31	3.30±0.11	7.84±0.42
Maize (one cut)	58.67±1.33	7.59±0.17	8.65	--	--	7.59±0.17
Sorghum (2 cuts)	96.00±2.08	17.04±0.37	8.75	--	--	17.04±0.37

Table 2. Nutritive value of different forage crops in heifer

Particular	Treatment Means ±SE					
	Annual Rye	Berseem	Oat	Wheat	Maize	Sorghum
DMI (kg/100kg BW)	2.84 ^d ±0.11	2.71 ^{cd} ±0.09	2.43 ^{bc} ±0.05	2.61 ^{cd} ±0.03	2.13 ^{ab} ±0.05	2.09 ^a ±0.07
DMD (%)	83.70 ^{bc} ±0.97	78.36 ^b ±1.77	84.61 ^c ±1.25	77.99 ^b ±0.59	66.60 ^a ±2.13	65.47 ^a ±0.51
CFD (%)	87.43 ^c ±0.72	79.79 ^{bc} ±2.88	87.12 ^c ±1.11	78.43 ^b ±0.40	65.53 ^a ±2.95	61.43 ^a ±1.87
CPD (%)	77.27 ^c ±2.25	74.01 ^{bc} ±1.19	65.87 ^b ±1.91	72.84 ^{bc} ±0.09	46.07 ^a ±3.68	43.83 ^a ±0.89
DCP (%)	13.23 ^c ±0.38	14.29 ^d ±0.23	7.57 ^b ±0.22	12.72 ^c ±0.01	3.99 ^a ±0.32	3.84 ^a ±0.08
DE (Kcal/kg)	3298 ^c ±37.36	3019 ^b ±62.37	3215 ^{bc} ±53.07	3095 ^{bc} ±16.29	2414 ^a ±99.89	2382 ^a ±25.41

Value having different superscripts in a row differ significantly (P<0.01)

Conclusion

Berseem and/or Annual Rye may be the best option for fodder production during Rabi season; and multi cut sorghum during Kharif considering forage yield protein content. Nutritive value of annual rye and berseem forage is better than oat. The multicut sorghum, maize and oat forages require supplementation of legume forage to make balance nutrient contents. The forage intake and their nutrients digestibility are better in cattle calves than buffalo calves.

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