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Research Article

STUDY ON FEED INVENTORY OF BUFFALOES IN SMALLHOLDER AND COMMERCIAL MILK PRODUCTION SYSTEMS IN HISAR DISTRICT OF HARYANA

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ABSTRACT

The present study was conducted with an aim to collect data on dry matter intake of Murrah buffaloes in smallholder and commercial farms of Hisar district. The data was collected from 75 smallholder and 4 commercial farms by interviewing farmers and farm managers from October 2015 to March 2016. Buffaloes were categorised in different groups as lactating, non-lactating, heifers (1-2 year age) and heifers (2-3 year age). Feed inventory of each animal in both types of farms was made using feeding calendar of a year in semi structured interview schedule. With the help of feeding calendar of past year, utilized feeds were listed for each month. The available farm records were used as data in case of commercial farms. Feed inventory revealed considerable variations in feeding practice in both types of farms. This in all likelihood will result in significant variation in GHG emission not only from enteric fermentation but because of feed production and manure. The data presented in the article can be used to reliably estimate GHG production in both the types of production systems.

Key words: Feed inventory, buffalo, Haryana

Haryana holds a special place in the field of milk production with 80% milk contributed by buffaloes. Haryana is also known for one of the finest buffalo breed in the world, Murrah which is an integral part of mixed crop–livestock system of rural smallholder farm since long. These production systems have evolved over long periods of time generally responding to the local conditions like availability of green fodders, crop residues, agro industries by-products and local grasses. At the same time, the commercial farms rearing buffaloes have also come up in and around cities. The dilemma that the policy makers face today is: which of the production systems should be favoured? The rural production systems are associated with livelihoods of a large percentage of population and are environment friendly. On the other hand, the commercial modes of production are considered greenhouse gases (GHG) emission friendly given their higher productivity. Enteric fermentation constitutes ~91 % of the total methane emissions from Indian livestock (Chhabra *et al*., 2009). However, high yielding animals require more dry matter to produce higher milk and methane production is closely related to dry matter intake (Bannink *et al.* 2010). Another argument is that as dry matter intake increases the percentage of gross energy (GE) lost as methane decreases (Kebreab *et al.,* 2006). Further, the production of different feeds and fodders and their relative share in animal diets are likely to induce significant variations in the methane and other green house gas emissions. Therefore, there is a need to ascertain as to what is being fed in both the types of production systems. Keeping in view the above facts, the present study was conducted to collect data regarding feeding of buffaloes in smallholder and commercial milk production systems.

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MATERIALS AND METHODS

Smallholder farms and commercial farms were selected for primary data collection from Hisar district. Three villages were selected from a list of villages of Hisar district using simple lottery method. The selected villages were – Bherian, Ravalwas and Sisai. From each village 25 farmers were selected randomly. Thus primary data was collected from 75 smallholder farmers. Selection of commercial farms was done randomly from the list of commercial buffalo farms which was prepared in consultation with the Animal Husbandry department. Four farms were chosen randomly to obtain data. The farms included -three private farms and one buffalo farm of this university. A semi structured interview schedule and observation sheet was developed with the provisions for all the relevant variables in keeping with the objectives of the investigation. The data was collected by interviewing all the respondents from October 2015 to March 2016.

Buffaloes were categorised in different groups i.e., lactating, non-lactating, heifers (1-2 years of age) and heifers (2-3 years of age).

Feed inventory of each animal in both types of farms was prepared using feeding calendar for whole year with the help of a semi structured interview schedule. Similar procedure has earlier been used by Moll *et al.* (2007) and Weiler *et al.* (2014). With the help of feeding calendar of past year, utilized feeds were listed for each month. The feed and fodder used by each animal in smallholder farms were estimated for a year. On-farm feeding records were used in case of commercial farms.

RESULTS AND DISCUSSION

Rural milk production systems are in principle environment friendly when compared with commercial modes of production. But if the commercial modes of production are presumed to be better in terms of productivity – one would be tempted to believe otherwise i.e. the commercial modes of production are relatively environment friendly. A reliable estimation of GHG based on actual feeding practices is feed. Reliable estimation of GHG emissions rests primarily on the validity and reliability of data pertaining to the feeding of animals. There are wide variations in the estimates of GHG especially enteric methane. In terms of methane emissions caused per kg of milk production in India, the estimates vary from 83 grams to 242 grams (Saxena, 2002). An estimation based on reliable primary data will go a long way in advancement in the quest for estimating reliable GHG emission. The study revealed that there are considerable variations in feeding practices in both types of farms (Tables 1 to 5). The major fodder crops fed to animals were sorghum, oat, berseem and maize in both the production systems. It is noteworthy here that the farmers in rural areas relied less on external inputs (especially feed and fodder) whereas the commercial farms relied largely on inputs from markets. This in turn led to major variations in the feed ingredients used. Also there were significant variations in different feed components used in different villages. For example, the farmers of Sisai village were feeding higher quantities of sorghum compared to farmers of other two villages (Table 1). This data will allow reliable calculation of green house gas emissions from both the types of production systems i.e. village level and commercial farm. The calculations of GHG estimation from both types of farms will in turn allow informed decision making. It is noteworthy that the policy makers are at cross roads in the absence of reliable estimate of GHG emissions from both types of production systems. It is generally argued that commercial systems are more efficient given their higher productivity. The counter argument that is put forth often is, that rural smallholder production systems are environmentally less damaging because they entail less of distortions in the natural systems. The data presented in the article can be used to estimate GHG production in both the types of production systems for reliable estimation GHS emissions. It is suggested that more such studies should be conducted with larger samples so as to arrive at feed consumption patterns in different production systems. Estimation of GHG emission from different agro-ecological and production system will pave way for informed decision making.

Table 1

Average quantities of different feeds and fodders fed to lactating buffalo in smallholder farms in a year*

Feed type	Feed ingredients (kg)	Feed (in kg) given to lactating buffalo in smallholder farms in a year at			
		Bherian	Ravalwas	Sisai	Overall
Green fodder	Sorghum	2086.4±1092.39	1425.20±886.31	3769.13±1238.54	2426.91±1208.49
	Oat	872.88±445.26	776.75±497.70	905.04±662.19	851.55±66.75
	Berseem	1528.45±939.83	1258.12±750.47	2447.85±1275.83	1744.81±623.67
	Maize	11.04±55.2	0	896.43±817.05	302.49±514.39
	Local grass	2152.5±1226.78	2414.33±2178.47	1268.69±600.88	1968.63±628.51
Dry fodder	Wheat straw	2354.99±455.91	1246.04±480.22	1502.19±395.82	2090.50±510.35
Concentrate	Cotton seed cake	1047.42±399.62	1033.5±405.60	829.76±272.91	970.22±121.84
	Cotton seed	121.74±171.12	119.20±242.25	686.75±182.15	309.23±326.94
	Gram hull	171.58±252.01	154.41±259.61	23.80±83.52	116.60±80.82
	Wheat bran	488.09±271.98	674.29±305.56	499.60±242.72	553.99±104.33
	Wheat flour	372.42±289.35	17.77±87.06	403.13±161.93	264.44±214.17
	Pearl millet grain	16.28±42.99	38.29±92.74	0	18.19±19.21
	Barley grain	14.6±50.53	0	0	4.86±8.42

*All values are mean±SD

Table 2

Average quantities of different feeds and fodders fed to non-lactating buffalo in smallholder farms in a year*

Feed type	Feed ingredients (kg)	Feed (in kg) given to lactating buffalo in smallholder farms in a year at		
		Bherian	Ravalwas	Sisai
Green fodder	Sorghum	1842±782.50	1814.87±645.82	4309±1442.23
	Oat	1010.4±453.21	941.75±355.57	1178.7±599.51
	Berseem	1294.7±832.51	1573.53±568.70	2674.92±1570.96
	Maize	0	0	714.6±820.84
	Local grass	1814.5±621.75	1287.62±961.96	1328.5±579.97
Dry Fodder	Wheat straw	3138.3±1572.15	3080.56±866.59	2140.75±834.64
Concentrate	Cotton seed cake	0	190±537.40	36.5±115.42
	Cotton seed	0	136.87±271.56	0
	Gram hull	133.8±184.47	129.25±265.02	0
	Wheat bran	498.4±316.97	596.93±447.61	467.6±212.70
	Wheat flour	571.9±390.24	121.87±234.97	570±168.59
	Pearl millet grain	0	22.5±63.63	0
	Barley grain	36.5±81.61	0	0

*All values are mean±SD

Table 3

Average quantities of different feeds and fodders fed to heifer (1-2 years age) in smallholder farms in a year*

Feed type	Feed ingredients (kg)	Feed (in kg) given to heifer (1-2 years of age) in smallholder farms in a year at village		
		Bherian	Ravalwas	Sisai
Green fodder	Sorghum	1031.25±453.03	468.16±438.16	749.62±445.58
	Oat	238.64±171.66	263.22±205.12	250.93±188.39
	Berseem	695±562.54	577.03±576.40	636.01±569.40
	Maize	0	151.67±455	70.83±113.75
	Local grass	992.58±564.25	1680.83±1151.55	1336.7±857.9
Dry fodder	Wheat straw	1246.04±469.92	1802.18±956.13	1524.02
Concentrate	Cotton seed cake	0	0	0
	Cotton seed	0	0	0
	Gram hull	0	118.34±241.64	0
	Wheat bran	185.47±162.03	229.83±212.47	257.65±156
	Wheat flour	60.84±149.01	0	0
	Pearl millet grain	0	0	0
	Barley grain	0	0	0

*All values are mean±SD

Table 4

Average quantities of different feeds and fodders fed to heifer (2-3 year age) in smallholder farms in a year

Feed type	Feed ingredients (kg)	Feed (in kg) given to heifer (1-2 years of age) in smallholder farms in a year at village		
		Bherian	Ravalwas	Sisai
Green fodder	Sorghum	1157.66±472.29	639.6±378.32	1865.34±671.02
	Oat	612.95±229.08	561.8±275.30	797.42±222.28
	Berseem	939.48±669.99	957.9±262.01	1208.48±335.36
	Maize	76.38±229.16	0	214.92±256.55
	Local grass	1402.70±827.42	2165.2±1462.81	1325.96±558.91
Dry fodder	Wheat straw	1527.5±721.51	2359.9±307.17	1608.15±396.83
Concentrate	Cotton seed cake	20.28±60.84	0	0
	Cotton seed	0	0	0
	Gram hull	60.84±91.25	0	0
	Wheat bran	246.78±328.47	511±237.95	196.54±240.98
	Wheat flour	223.05±299.57	109.5±244.84	203.09±208.39
	Pearl millet grain	20.28±60.83	0	0
	Barley grain	0	0	0

*All values are mean±SD

Table 5

Average quantities of different feeds and fodders fed to animals in commercial farms in a year

Feed type	Feed ingredients (kg)	Animal category			
		Lactating	Non-lactating	Heifer (1-2 years of age)	Heifer (2-3 years of age)
Green fodder	Sorghum	2358.86	2358.86	1123	1029
	Oat	528.75	528.75	211.4	113.25
	Berseem	1625.09	1895.09	981.5	1179.25
	Maize	1110.33	1110.33	826	749.5
	Pearl millet	29.91	29.91	0	0
	China cabbage	13.80	13.80	0	0
Dry fodder	Wheat straw	2144.37	2244.75	730	1460
Concentrate	Cotton seed cake	421.37	0	0	0
	Cotton seed	17.125	0	0	0
	Gram hull	307.5	228.12	0	182.5
	Wheat bran	597.69	547.5	91.25	182.5
	wheat flour	154	159.69	0	0
	Pearl millet grain	28.75	28.75	0	0
	Gram chuni	136.87	136.87	0	0
	Oat grain	0	19.93	0	0
	Wheat grain	75.28	26.58	124.03	155.04
	Barley grain	75.28	26.58	0	0
	Maize bran	50.19	13.29	0	0
	Mustard cake	75.28	59.80	106.31	132.89
	Soybean meal	25.09	19.93	0	0
	Ground nut cake	35.13	13.29	0	0
	Rice polish	50.19	0	0	0
	Deoiled rice polish	50.19	86.38	124.03	155.04

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