

Feed and Fodder Production in Different Agro-Climatic Zones and its Utilizations for the Livestock of Odisha

PRELIMINARY REPORT ON FEEDING PATTERN OF LIVESTOCK AND FEED REQUIREMENT IN DIFFERENT AGRO-CLIMATIC ZONES OF ODISHA



Implemented by:

International Livestock Research Institute (ILRI), New Delhi

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Submitted to:

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1. Introduction

Odisha is characterized by complex and mixture of different agro-climatic situations, wide variations exists within and between agro-climatic regions. The east and north-eastern of Odisha have more Kharif and Rabi intercropped area is paddy with pulses. The western part is the mixture of paddy, maize, cotton and other cash crops. The details of cropping pattern in different agro-climatic zones is presented in Table 1.

Table 1: Major crops grown in different agro-climatic zones of Odisha

Zones and districts covered	Climates	Soils Type	Cropping system
Zone No 1: North-Western Plateau Zone (Sundargarh, parts of Deogarh, Sambalpur & Jharsuguda)	Warm & humid	Red, Mixed Red & Black, Mixed Red & Yellow	Upland area: Rice+Horsegram/Mustard, Niger, Maize-Mustard, Rice-Castor Medium land area: Rice-Mustard/Linseed/ Black gram Lowland area: Rice-Black gram/Lentil/Linseed
Zone No 2: North Central Plateau Zone (Mayurbhanj, major parts of Keonjhar except Anandapur & Ghasipura block)	Warm & humid	Red, Lateritic, Black	Upland area: Groundnut, Maize-Horsegram, Groundnut-Castor Medium land area: Rice-Mustard, Rice-Green gram/ Blackgram, Rice-Chickpea, Rice-Sunflower Low land area:

			Rice-Blackgram
Zone No 3: North Eastern Coastal Plain Zone (Balasore, Bhadrak, parts of Jajpur & hatdihi, Ghasipura and Anandpur block of Keonjhar)	Hot & moist sub-humid	Red, Mixed Red & Black and Black	The following are the principal cropping system in Rainfed upland, medium land, lowlands. Rainfed Upland- Rice- Mung/Pulses/Black gram/Groundnut- Jute Low Land- Jute- Rice- Pulses, Rice-Blackgram/ Mung.
Zone No 4: East and South Eastern Coastal Zone (Kendrapara, Khurda, Jagatsinghpur, part of Cuttack , Puri, Nayagarh & part of Ganjam)	Hot & moist sub humid	Red & Yellow, Red & Black, Black, Brown forest, Lateritic	Cropping intensity of the zone is 168%. The cropping pattern of the zone is as follows- Rice-Rice, Rice-Pulse, Rice-Pulse/ Groundnut, Rice-Potato-Til, Greengram, Early rice-Cauliflower, Cabbage, Okra, Sugarcane.
Zone No 5: North Eastern Ghat Zone (Phulbani, Rayagada, Gajapati, part of Ganjam & small patches of Koraput)	Hot & moist sub humid	Alluvial, Red, Lateritic, Mixed Red & Black	Unirrigated upland area: Rice-Greengram /Blackgram/ Horsegram, Finger Millet. Irrigated upland area: Rice-Potato-Summer vegetable, Rice-Greengram/ Vegetable, Summer vegetable.

Zone No 6: Eastern Ghat Highland Zone (10 blockss of Koraput, Nabarangpur)	Hot & moist sub humid	Red, Brown forest, Red & Yellow, Mixed Red & Black	Upland area: Ragi, Rice, Niger, Horse gram, Pearl millet, Maize. Medium land area: Vegetables, Rice-Maize, Rice- Ragi, Maize-Vegetables, Rice- Lentil, Rice-Wheat-Blackgram Low land area: Rice (Monocrop), Rice-Rice
Zone No 7: South Eastern Ghat Zone (Koraput, Malkangiri, Similiguda)	Hot & moist sub humid	Lateritic, Red & Yellow, Mixed Red & Black	Rice is the principal crop occupying 63% of the gross cropped area of the Zone. Other important crops that are widely cultivated are Millets (20%), Mesta (1.3%) and Sesamum (37.08%). A number of fruit crops particularly Mango, Lime and Guava are successfully grown in the zone.
Zone No 8: Western Undulating Zone (Kalahandi & Nuapada)	Moist sub humid	Red, Lateritic, Deltalc alluvial, Coastal alluvial & Saline	Rainfed mono cropped: Rice, Maize, Groundnut, Blackgram, Ragi, Sesamum, Horsegram, Pigeonpea. Rainfed double cropped: Rice-Horsegram, Groundnut- Horsegram/Mustard, Maize- Mustard/Niger/ Sesamum Irrigated area: Rice-Wheat, Rice-Rice, Rice- Vegetables, Vegetables- Sugarcane.

Zone No 9: West Central Table Land Zone (Bargarh, Bolangir, Boudh, Sonepur, parts of Sambalpur & Jharsuguda)	Hot & Humid Hot & moist, sub humid	Saline, Lateritic, Alluvial, Red & Mixed red & Black	Cropping intensity is 154.0% in the zone. There are 7 farming situations in the zone and the cropping system of each farming situation is different depending on rainfall and socio economics condition. Major Cropping System: Double/ triple Crop: Rice-Vegetables, Rice-Blackgram, Groundnut-Vegetables, Rice-Groundnut, Rice-Mustard, Rice-Greengram.
Zone No 10: Mid Central Table Land Zone (Angul, Dhenkanal, parts of Cuttack & Jajpur)	Hot & moist sub humid	Brown forest, Lateritic Alluvial, Red, Mixed Red & Black	Rice is the principal crop in the area, comprising of 53% of the gross cultivated area, Pulses comprising Horsegram, Green gram, Black gram constitute 15% of gross cropped area.

Livestock play an important role in most small-scale farming systems throughout the world and even it more prominent in South Asia. This is true in case of Odisha also. They provide traction to cultivate fields, manure to maintain crop productivity, and nutritious food products for human consumption and income-generation. Despite the importance of livestock in improving the livelihood of rural poor, inadequate livestock nutrition is a common problem in Odisha, which plays an important component of livestock rearing, constitutes 60-70 per cent of total livestock rearing cost, and a major factor affecting the development of viable livestock industries in rural economy. It is well know that cattle feeding practice in Odisha are very traditional, where farmers choose own ingredients and feed the

cattle based on availability at his/her house. The productivity of the cattle is limited because of their poor genetic make-up and lack of access to better quality of feed.

Crop residue plays an important role for livestock feeding which contributes more than more 70% of total feeding resources. The availability of crop residues is closely related to the farming system, crop produced and the intensity of cultivation. The potential use of crop residues as livestock feed having great importance in integrated crop-livestock farming systems. When crop and livestock production are being segregated, most of the crop residues are being still wastage. Feeding pattern in coastal Odisha is mostly depend on the rice straw while the place closer to forest area are mostly depend on the forest wastages.

For improving the livestock productivity, there needs to increase the availability of quality feed at farmer's door as well at lower cost. With growing demand for animal feed, new technologies and techniques need to be continuously developed and to transfer at larger scale to avoid the uncertain increase in feed price along with food price. Appropriate technology should be developed to fit the livestock production needs of the rural poor. Further, feed research in Odisha should be based on the specific conditions of each agro-ecological zone. Different ecological zones (i.e. arid, semiarid and sub-humid) will require different research based approach.

Appropriate research strategies therefore seek to identify the need of systems, potentials and constraints of local economy, design alternative system and evaluate interventions and alternative systems as well technically practical and economically feasible. In this context, International Livestock Research Institute (ILRI) has tried to explore the feed requirement, availability and feeding pattern different districts of Odisha special reference to agro-climatic zones. This report contains the preliminary report outcome of feed requirement and feeding pattern analysis.

2. Data

Before going a detail survey, a household census survey was implemented by the International Livestock Research Institute (ILRI) among 900 villages from all 30 districts to examine percentage of farmers are cultivating fodder, buying concentrate and number of farmers are processing crop residue before feeding to their livestock in different agro climatic zones of Odisha. The data was collected only from livestock keeper.

For estimated total feed (dry, green and concentrate) demand, we have used 2012 livestock census data. Feed intake of different category of livestock estimated based on ICAR-NIANP formula. The details are below.

Table 2: Feed Requirement for different livestock species across different age group

Livestock Indicators	Weight (kg)	avg bwt	DM Requirement @100 kg	Total DM requirement	Roughages (60% of DM)	Concentrate (40% of DM)	60%dry (out of total roughages)	60% Green (out of total roughages)	Concentrate	Dry fodder	Green Fodder
CB: Female≤ 1 Years	150	90	2.25	2.025	1.215	0.81	0.729	0.486	0.891	0.8019	1.944
CB: Female≤ 1-2.5 Years	250	200	2.3	4.6	2.76	1.84	1.656	1.104	2.024	1.8216	4.416
CB: Female>2.5 Years In Milk	300	300	2.5	7.5	4.5	3	2.7	1.8	3.3	2.97	7.2
CB: Female>2.5 Years dry	350	350	2.3	8.05	4.83	3.22	2.898	1.932	3.542	3.1878	7.728
CB: Female>2.5 Years not calved once	350	350	2.4	8.4	5.04	3.36	3.024	2.016	3.696	3.3264	8.064
CB: Female>2.5 Years others	350	350	2.4	8.4	5.04	3.36	3.024	2.016	3.696	3.3264	8.064
CB: ≤ 1.5 Years Male	200	115	2.3	2.645	1.587	1.058	0.9522	0.6348	1.1638	1.04742	2.5392
CB: ≥ 1.5 Years Male	250	250	2.3	5.75	3.45	2.3	2.07	1.38	2.53	2.277	5.52
IND: Female ≤ 1 Years	90	60	2.25	1.35	0.81	0.54	0.486	0.324	0.594	0.5346	1.296
IND: Female≤ 1-3 Years	175	135	2.25	3.0375	1.8225	1.215	1.0935	0.729	1.3365	1.20285	2.916
IND : Female>3 Years In Milk	225	225	2.5	5.625	3.375	2.25	2.025	1.35	2.475	2.2275	5.4

IND: Female>3 Years dry	250	250	2.25	5.625	3.375	2.25	2.025	1.35	2.475	2.2275	5.4
IND: Female>3 Years not calved once	275	275	2.25	6.1875	3.7125	2.475	2.2275	1.485	2.7225	2.45025	5.94
IND: Female>3 Years others	275	275	2.3	6.325	3.795	2.53	2.277	1.518	2.783	2.5047	6.072
IND: ≤ 1.5 Years Male	150	80	2.25	1.8	1.08	0.72	0.648	0.432	0.792	0.7128	1.728
IND: ≥ 1.5 Years Male	200	200	2.4	4.8	2.88	1.92	1.728	1.152	2.112	1.9008	4.608
BF :Female $\leq$ 1 Years	170	100	2.25	2.25	1.35	0.9	0.81	0.54	0.99	0.891	2.16
BF: Female $\leq$ 1-3 Years	260	215	2.5	5.375	3.225	2.15	1.935	1.29	2.365	2.1285	5.16
BF: Female>3 Years In Milk	350	350	2.6	9.1	5.46	3.64	3.276	2.184	4.004	3.6036	8.736
BF: Female> 3 Years dry	375	375	2.4	9	5.4	3.6	3.24	2.16	3.96	3.564	8.64
BF: Female>3 Years not calved once	375	375	2.4	9	5.4	3.6	3.24	2.16	3.96	3.564	8.64
BF: Female>3 Years others	375	375	2.4	9	5.4	3.6	3.24	2.16	3.96	3.564	8.64
BF: ≤ 2 Years Male	180	105	2.5	2.625	1.575	1.05	0.945	0.63	1.155	1.0395	2.52
BF: ≥ 2 Years Male	325	325	2.6	8.45	5.07	3.38	3.042	2.028	3.718	3.3462	8.112

3. Outcome

Utilization Pattern

From the statistical analysis it is observed that among the sample farmers 4.5% of farmers are growing green fodder, 16.2 per cent of farmers are buying crop residue, 28.1 per cent of farmer are buying concentrate and only 4.3 per cent of farmers are processing (soaking, chaffing and others) before feeding to their livestock in the State. Among the different agro-climatic zones, higher percentage of farmer in North Eastern Coastal Plain are growing green fodder (8%) followed by farmers in Western Undulating Zone and least in South Eastern Ghat. However, in case of buying concentrate is higher in Zone 4 (East & South Eastern Coastal Plan) followed by Zone 3 (North Eastern Coastal Plain zone) and least in Zone 7 (South Eastern Ghat). Coming to buying of processing of crop residue higher percentage of farmer in Zone-4 are doing followed by Zone-2 (North Central Plateau).

ACZ 1: North Western Plateau

This zone is comprise with Sundargarh, parts of Deogarh, Sambalpur (kuchinda) & part of Jharsuguda. In this zone, among the surveyed sample farmers only 2.4 per cent of farmers are growing green fodder, while 3.0 per cent of farmers are processing crop residue (chopping, urea treatment and others) before feeding to their livestock. Coming to the buying of concentrate feed, only 18.9 per cent of farmers are buying the concentrate feed. Further, 3.0 per cent of farmers are buying crop residue for livestock feed.

Zone 2: North Central Plateau

This zone is comprise with Mayurbhanj, major parts of Keonjhar except Anandapur, Ghasipura and Hatdihi Block. It is observed that only 0.6 per cent of farmers are growing green fodder while 11.6 per cent of farmers are buying crop residue for their livestock feed. In addition, 12. 6 per cent of farmers are buying

concentrate and 4.9 per cent of farmers are processing crop residue before feeding to their livestock, which is higher than the Zone 1.

Table 2: Agro-climatic zones wise farmers growing green fodder, processing straw and buying concentrate

Name of the Zone	Buying Crop Residue		Buying Concentrate		Processing Crop Residue		Growing Green Fodder	
	Yes	No	Yes	No	Yes	No	Yes	No
North Western Plateau	121 (3.0)	3887 (97.0)	758 (18.9)	3,250 (81.1)	122 (3.0)	3,886 (97.0)	97 (2.4)	3911 (97.6)
North Central Plateau	444 (11.1)	3541 (88.9)	504 (12.6)	3,481 (87.4)	196 (4.9)	3,789 (95.1)	23 (0.6)	3962 (99.4)
North Eastern Coastal Plain	1,629 (27.9)	4201 (72.1)	1,930 (33.1)	3,900 (66.9)	239 (4.1)	5,591 (95.9)	466 (8.0)	5364 (92.0)
East & South Eastern Coastal Plain	2,902 (36.0)	5,157 (64.0)	4,784 (59.4)	3,275 (40.6)	565 (7.0)	7,494 (93.0)	528 (6.6)	7531 (93.4)
North Eastern Ghat	1,015 (11.3)	7989 (88.7)	1,571 (17.4)	7,433 (82.6)	224 (2.5)	8,780 (97.5)	98 (1.1)	8906 (98.9)
Eastern Ghat High Land	536 (19.2)	2254 (80.8)	372 (13.3)	2,418 (86.7)	70 (2.5)	2,720 (97.5)	88 (3.2)	2702 (96.8)
South Eastern Ghat	43 (3.0)	1367 (97.0)	142 (10.1)	1,268 (89.9)	5 (0.4)	1,405 (99.6)	12 (0.9)	1398 (99.1)
Western Undulating Zone	930 (16.8)	4612 (83.2)	1,309 (23.6)	4,233 (76.4)	138 (2.5)	5,404 (97.5)	397 (7.2)	5145 (92.8)
Western Central Table Land	288 (4.6)	6018 (95.4)	1,768 (28.0)	4,538 (72.0)	553 (8.8)	5,753 (91.2)	408 (6.5)	5898 (93.5)
Mid-Central Table Land	190 (6.1)	2917 (93.9)	931 (30.0)	2,176 (70.0)	40 (1.3)	3,067 (98.7)	142 (4.6)	2965 (95.4)
Total	8098 (16.2)	4194 3 (83.8)	1406 9 (28.1)	3597 2 (71.9)	2152 (4.3)	4788 9 (95.7)	2259 (4.5)	4778 2 (95.5)

Zone 3: North Eastern Coastal Plain

This zone is mostly covered with costal and bank of Bay of Bengal. It covers Balasore, Bhadrak, parts of Jajpur & Hatadihi block of Keonjhar district. In this zone, 27.9 per cent of farmers buy crop residue for feeding of their livestock even this zone rice covers most of the area, while only 4.1 per cent of farmers' process

before feeding to their livestock (chopping, soaking and any treatment). It is important to note that 8 per cent of farmer are growing green fodder, which more than the State's average. Around 33.0 per cent of farmers are buying concentrate feed to feed their animals.

Zone 4: East & South Eastern Coastal Plain

Kendrapada, Khorda, Jagatsinghpur, Puri, Nayagarh and a part of Cuttack & coastal part of Ganjam come under this zone. In this zone, it reveals that only 6.6 per cent of farmers are growing green fodder, 7 per cent of farmers are processing crop residue before feeding to their livestock. Further 36 per cent of farmers are buying crop residue for livestock feed while 59.4 per cent of farmers are purchasing concentrate feed for their livestock.

Zone 5: North Eastern Ghat

This agro climatic zone comprises of Phulbani (Kandhamal), Rayagada, and Gajapati, a part of Ganjam and small patches of Koraput. It has been found from surveyed village only 1.1 per cent farmers are cultivating green fodder, 2.5 per cent farmers are engaged in processing crop residues, 17.4 per cent farmers are buying concentrated while 11.3 per cent farmers are buying crop residues for maintaining their livestock.

Zone 6: Eastern Ghat High Land

Major parts of Koraput and Nabarangpur district come under this agro climatic zone. As maize is the major crop which covers more than 50% of agricultural land, around 19.2 per cent of farmers are buying crop residue (paddy straw) to feed their livestock, while only 3.2 per cent of sample farmers are growing green fodder. Coming to concentrate feed, only 13 per cent of farmers buying concentrate feed. The low percentage of farmers buying concentrate is could be the fact that as these farmers grow maize, there is chance of using maize as concentrated feed for their livestock. It is observed that only 2.5 per cent of farmers are processing crop residues before feeding to their livestock.

Zone 7: South Eastern Ghat

Malkanagiri district comes under this Agro-Climatic zone. It is observed from survey that only 0.9 per cent of farmers are growing green fodder, 0.4 per cent of farmers are processing crop residue, 10.1 per cent of farmers are purchasing concentrate feed while 3.0 per cent of farmers are buying crop residue for their livestock.

Zone 8: Western Undulating Zone

District Kalahandi and Nuapada come under this agro climatic zone. It is found that 7.2 per cent of farmers are growing green fodder, 2.5 per cent of farmers are processing crop residue, 23.6 per cent of farmers are buying concentrate feed and 16.8 per cent farmers are buying crop residue for feeding of their livestock.

Zone 9: Western Central Table Land

District like Baragarh, Bolangir, Boudh, Sonepur, Jharsuguda and a part of Sambalpur fall under this agro climatic zone. The survey reveals that 6.5 per cent of farmers are growing green fodder, 8.8 of farmers are processing crop residue, 28 per cent of farmers are buying concentrate feed and 4.6 of farmers are buying crop residue for feeding to their livestock.

Zone 10: Mid-Central Table Land

This agro climatic zone comprises of districts Anugul, Dhenkanal, Jajpur and parts of Cuttack. The study of survey samples reveals that 4.6 of farmers are growing green fodder, 1.3 per cent of farmers are processing crop residue, 30 per cent of farmers are buying concentrate feed and 6.1 per cent of farmers are buying crop residue for feeding of their livestock.

Feed Requirement

Table 2 represents the district-wise feed requirement. The descriptive statistics indicated that as per the 2012 livestock census there is required of 229773.38, 65035 and 66097 thousands kg of green grass, dry fodder and concentrate feed required to maintain the livestock health properly. Among the

district, highest amount of feed (green, dry and concentrate) required in Balasore district followed by Mayurbhanj and least in Deogarh district.

Table 3: District wise feed and fodder requirement

District	Total Green (000 kg)	Total dry (000 kg)	Total Concentrate Feed (000 kg)
Anugul	10063.19	2166.86	2198.13
Balangir	9049.34	1951.75	1990.47
Baleshwar	19798.82	4309.88	4354.07
Bargarh	8354.05	1810.10	1838.18
Baudh	4374.44	942.84	958.74
Bhadrak	13760.21	3001.93	3029.69
Cuttack	15873.61	3488.10	3552.31
Deogarh	3743.10	804.14	816.60
Dhenkanal	11249.26	2446.62	2477.63
Gajapati	4352.19	938.17	957.02
Ganjam	16407.71	3573.20	3650.69
Jagatsinghapur	9380.25	2071.32	2112.27
Jajapur	13367.38	2914.97	2951.07
Jharsuguda	2784.89	599.85	609.99
Kalahandi	8055.38	1738.49	1769.32
Kandhamal	8638.68	1860.47	1897.12
Kendrapara	10716.37	2354.42	2406.92
Kendujhar	14470.70	3114.16	3158.20
Khordha	8943.69	1957.84	1992.95
Koraput	12482.42	2696.84	2754.85
Malkangiri	8700.87	1881.02	1916.22
Mayurbhanj	18625.14	4001.20	4043.00
Nabarangapur	9405.76	2020.67	2056.35
Nayagarh	5868.98	1269.17	1284.57
Nuapada	4790.38	1028.56	1041.36
Puri	13320.05	2932.62	3004.45
Rayagada	8334.33	1806.72	1845.34
Sambalpur	6810.34	1466.31	1486.99
Subarnapur	4152.59	898.43	913.30
Sundargarh	13899.26	2987.94	3027.95
Total	299773.38	65034.59	66095.74

4. Conclusion

The preliminary report indicated that 4.5 per cent of farmers are growing green fodder, 16.2 per cent of farmers are buying crop residues (paddy straw, 28.1 per cent of farmer are buying concentrate and only 4.3 per cent of farmers are processing (soaking, chaffing and others) before feeding to their livestock in the State. As per the 2012 livestock census there is required of 229773.38, 65035 and 66097 thousands kg of green grass, dry fodder and concentrate feed required to maintain the livestock health properly.