International Workshop
Improving the Livestock Feeding Practices and Enhancement of Feed and Fodder Availability in Odisha

Society for Management of Information, Learning & Extension (SMILE),
Department of Animal Husbandry & Veterinary Services, Govt. of Odisha
International Livestock Research Institute (ILRI), New Delhi
International Workshop
Improving the Livestock Feeding Practices and Enhancement of Feed and Fodder Availability in Odisha

Organised by
Society for Management of Information, Learning & Extension (SMILE)
Department of Animal Husbandry & Veterinary Services, Govt. of Odisha

In Collaboration with
International Livestock Research Institute (ILRI), New Delhi
Compilation

**Dr. Braja Bandhu Swain**
Scientist, ILRI
New Delhi

**Dr. Basudev Sunani**
Coordinator, SMILE
Laxmisagar, Bhubaneswar
I am happy that, Society for Management of Information, Learning and Extension (SMILE), Laxmisagar, Bhubaneswar is organising a one-day International Workshop in collaboration with International Livestock Research Institute (ILRI), New Delhi on "Improving Livestock Feeding Practices and Enhancement of Feed and Fodder Availability in Odisha" on 27th August, 2015.

I hope, this initiative of SMILE and ILRI will bring experiences from various States to guide the future course of action for improving the availability of feed and fodder in the State. This effort will also facilitate to promote appropriate and efficient feeding practices for adoption at the farmer’s doorstep.

I wish, the outcome of this Workshop will definitely benefit all the needy farmers of the State of Odisha and those who are depending on livestock farming for their livelihood.

I sincerely wish the success of the Workshop.

(Pradeep Maharathy)
Shri Gokul Chandra Pati, IAS
Chief Secretary, Odisha

MESSAGE

I am glad to know that an international workshop on 'Improving Livestock Feeding Practices and Enhancement of Feed & Feeder availability in Odisha' is going to be organized under the joint aegis of SMILE, Department of Fisheries & Animal Resources Development, Govt of Odisha and the International Livestock Research Institute (ILRI), New Delhi on 27th August, 2015 at Bhubaneswar. A Souvenir is also being brought out to record the event for future reference.

Feed and Fodder is a basic requirement for improving livestock in the State. Appropriate micronutrient mixture of the feed works as a medicine to prevent and cure many animal diseases along with meeting their need for food. Recent inventions in micro-biology, micro-nutrition and bio-tech have brought to light many innovative and cost effective techniques of preparing appropriate feed mix for the livestock of various geo-climatic zones. These techniques need to be popularized among the dairy farmers through field demonstration and extension services. The animal scientists, doctors and extension workers also need to have first hand practical knowledge about these innovations and their effectiveness. The theme of the Workshop has rightly been chosen by the collaborating partners.

I hope, the Workshop will provide a platform for indentifying innovative techniques through experience sharing and come up with actionable agenda for enhancing the qualitative feed & "feeder availability in the State.

I extend my compliments to the participating delegates and wish the Workshop all success.

(G.C. Pati)
Society for Management of Information, Learning and Extension (SMILE), Laxmisagar, Bhubaneswar, a society functioning under the aegis of the Department of Fisheries & Animal Resources Development, Government of Odisha in collaboration with International Livestock Research Institute (ILRI), New Delhi is organizing an International Workshop on "Improving Livestock Feeding Practices and Enhancement of Feed and Fodder Availability in Odisha" on 27th August, 2015.

It is a fact that Feed and Fodder accounts more than 70% of the cost of rearing of the dairy animals. Also, it has been internalized that, providing balanced nutrition is the key to success in dairy farming.

I feel extremely happy to note that such a collaboration has been initiated by SMILE and ILRI at the time of the need in the State.

I am sure, this workshop will immensely benefit the farming community especially the small and marginal farmers of the State for preparation of low cost ration by utilizing available raw materials and production of green fodder for successful dairy farming.

I hope the organisers will prepare a road map to increase the feed and fodder productions through a meaningful inter-Departmental convergence and coordination.

Shri Bishnupada Sethi, IAS
Commissioner-cum-Secretary to Govt.,
Fisheries and ARD Department
Govt. of Odisha, Bhubaneswar

MESSAGE

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(Bishnupada Sethi)
I am delighted that the International livestock Research Institute (ILRI) in collaboration with the Department of Fisheries & Animal Resources Development, Government of Odisha, is organising a one-day inter-departmental and international workshop on "Improving livestock Feeding Practices and Enhancing Feed and Fodder Availability in Odisha". This will be an ideal opportunity to prepare the future State Action Plan on Feed and Fodder, which aims to considerably increase the availability of feeds and fodder in the state by promoting appropriate and efficient technologies amongst small farmers. I sincerely hope this workshop will provide a stimulating platform for fruitful discussions leading to relevant outcomes addressing major problems faced by dairy farmers in Odisha.

I wish you all the best for the upcoming workshop.

Sincerely,

Immy Smith
Director General
International Livestock Research Institute (ILRI)
Nairobi, Kenya
That the collaboration of the International Livestock Research Institute (ILRI) within the CSISA programme with the Department of Fisheries & Animal Resources Development, Government of Odisha, as well as with the Orissa University of Agriculture and Technology (OUAT) has enabled this workshop on “Improving Livestock Feeding Practices and Enhancing Feed and Fodder Availability in Odisha” is a considerable achievement. Also, it is most rewarding to see the interest of so many other institutions and organisations in this topic. Furthermore, this interest is not limited to this occasion but is apparent from the various activities implemented and resources committed to achieving the common goal of supporting poor dairy producers and providing more milk to consumers. Through this workshop we hope to promote better feeding as a critical component of successful dairy intensification to a wide audience. We all know that many stakeholders have to closely work together to achieve lasting and significant change in the dairy sector. I am convinced that the discussions in this workshop will be an important step in this direction.

With best wishes for the upcoming workshop.

Nils Teufel
Scientist
International Livestock Research Institute (ILRI)
Nairobi, Kenya
ACKNOWLEDGEMENT

It becomes possible to bring out this Workshop Souvenir only because of the keen support received from several institutions and persons, who have responded our request and extended their love in this endeavour.

We are grateful to Shri Bishnupada Sethi, IAS, Commissioner-cum-Secretary, Fisheries and Animal Resources Development Department, Govt. of Odisha for his guidance throughout in the process of organizing such a great event and bringing out this document.

Special thanks are extended to Shri Debi Prasad Panda, IAS, Director, Department of Animal Husbandry and Veterinary Services, Govt. of Odisha, who has not only provided the infrastructure but also has played a key role in supporting and coordinating various International / National intellectuals/organisations working in the field of feed and fodder development to contribute their research findings.

Jimmy Smith, Director General, International Livestock Research Institute (ILRI) Nairobi, Kenya though staying far from this soil has motivated and extended his support to publish this Souvenir. We are thankful to him.

We express our gratitude to Dr. Lucy Lapar and Dr. Nils Teufel, Scientist, ILRI, without whom it would have been difficult to organise this workshop and publish this Souvenir.

We are also indebted to Dr. U.S. Patro, Joint Director-cum-Member Secretary, SMILE, Dr. H. K. Sahoo, DD Fodder Development, Sri Ranjeet Ekka, Fodder Officer, Directorate of AH & VS, who were continuously with us and sharing their constructive view for successful organization of the Workshop and bringing out of the Souvenir.

Faculty Members of SMILE and VOTI, Dr. G. C. Kar, Dr. S. N. Panda, Dr. J. R. Patnaik, Dr. Sanjukta Devi, Dr. Suvendu Sahoo, Dr. G.K. Tripathy and Dr. Asim Biswal were in each and every step of the journey. Their effort is highly appreciable.

Team Members of ILRI, Dr. Niranjan Panda, Mr. Pradeep Kumar Sahoo, were the integral part of the organizing team. Their contribution will be remembered for the long time to come. Thankful to Dr. Dhiraj Kumar Singh and Mr. Navendu Panday for their support.

Last but never the least, we are extremely thankful to our paper contributors, without their support, this volume of publication would never have been possible. They have made the dream in to reality and enriched the value of the Souvenir.

The success of the farmer is the pride of the State. We have tried to document their achievements in this Souvenir. Hope, their achievements will be model for all of us in the future.
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ମ୍ୟାବ ଜିକୋଲୁରୁ ଗ୍ରାମ ବାସକ୍ତ ବୃତ୍ତି ପ୍ରାକୁରୁ ଦରିବାର ଆରୋଧ ଭଳା. ୫୩୯୯ ସ୍ଥାନରୁ ଜିକୋଲୁ ବୃତ୍ତି ପ୍ରାକୁର ଜାନାଣା ପ୍ରସ୍ତାବର ବ୍ୟବହାର ପାଇଁ ଛାଓ କରିଛନ୍ତି। ମମୃତକୁ ପ୍ରାକୁର ବୃତ୍ତି ପ୍ରାକୁର ଜାନାଣା ପ୍ରସ୍ତାବର ବ୍ୟବହାର ପାଇଁ ଛାଓ କରିଛନ୍ତି। ମମୃତକୁ ପ୍ରାକୁର ବୃତ୍ତି ପ୍ରାକୁର ଜାନାଣା ପ୍ରସ୍ତାବର ବ୍ୟବହାର ପାଇଁ ଛାଓ କରିଛନ୍ତି।
Efficient utilization of crop residue and impact on livestock Productivity: A Study in Puri, Bhadrak and Mayurbhanj

Niranjan Panda\(^b\), Braja Bandhu Swain\(^a\), Nils Teufel\(^a\), Lucy Lapar\(^a\) and Pradeep Sahoo\(^a\)

Abstract:
Livestock ownership is more equitable than landholdings, 80 percent of livestock population are owned by landless, marginal and small landholders, providing about 40 percent of their annual income. However, with increasing the cost of commercial feed, unavailability of land for growing green fodder and stagnateof milk prices, farmers in Odisha have few incentives to intensify the livestock production. Nevertheless, opportunities have been identified which enable farmers to make more efficient use of their existing resources leading to considerable productivity increase. The study presents the experimental results on the impact of feeding chopped paddy straw or maize stover in combination with mineral mixture on productivity of dairy animals.

The experiment period was divided into four phases - pre-deworming(I), deworming period(II), period with feeding chopped straw/stover without mineral mixture(III), and feeding chopped straw with mineral mixture(IV). The results indicated that deworming the animal has no significant impact on milk yield; however increase in milk yield was observed in chopped period compared to un-chopped. Similar results also observed while we compared the milk yield between the period of feeding chopped straw maize stover with and without mineral mixture. Along with milk yield, serum calcium, Zinc and Copper status has improved after feeding chopped straw with mineral mixture supplementation. Farmers are not only benefited from increasing milk yield but by saving paddy straw (farmers managed to save 4-6 bundles straw per day/cattle). The cost

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1 - This paper is part of the CSISA project funded by Melinda Bill gates and USAID
\(a\) - International Livestock Research Institute (ILRI), Nairobi, Kenya
\(b\) - Associate Professor, Department of Animal Nutrition, College of CVSc& AH, Odisha University of Agriculture and Technology (OUAT)
benefits analysis shows that farmers could earn more INR 4500 (0.80 dollar)/day more per animal. It is recommended that feeding of chopped straw and maize stover along with mineral supplementation should be practised for better production and mineral status of animals. Steps should be taken to promote this practice for better and efficient utilization of crop residues.

Key Words: Crop residue, Small farmer and Livestock productivity

1. Introduction
Livestock sector in Odisha is confronted with different problems such as low productivity, high cost of commercial feed, low green fodder production, insufficient availability of dry fodder and low level of technology. Feed is an important component of livestock rearing, where ruminants are mostly raised with crop residues predominantly paddy straw. However, there is increasing shortage of fodder both dry and green -by 2025 there will be shortage of 25% of dry fodder while it is 65% for green fodder in India (Planning Commission of India, 2011). Similar problem is observed in Odisha too as very little green fodder is being cultivated, while paddy straw is the only dry fodder for cattle feed. The estimation indicated that annually 4.2 million tonnes shortage of paddy straw in Odisha, if all the straws are fed to animals. Addition to this there is increasing competition for use of paddy straw for mushroom cultivation, roofing and packaging. In future, it will aggravate the unavailability of straw for livestock feed due to increased cultivation of short-duration and low-height paddy and use of combine harvester that leaves a huge portion of straw in the field, often discarded. The gap between supply and demand of paddy straw in Odisha can be minimised only by efficient utilisation of crop residues as well increasing the total biomass production in the system.

For increasing the livestock productivity, there needs to improve the nutritional value of paddy straw. Chopping accompanied with soaking with water and supplementation with area specific mineral mixture is the very simple feeding technology that helps to improve the livestock productivity. However, the farmers of Odisha rarely fed chopped straw due to lack of knowledge and access to institutional support. Nevertheless, opportunities have been identified which enable farmers to make more efficient use of their existing resources leading to considerable increase in productivity. To facilitate farmers for feeding the chopped paddy straw 12 chaff cutters has been provided to 12 villagers and addition to training. In this context, the main objective of the present paper is to examine the impact of feeding chopped paddy straw on livestock productivity especially on milk and health.

1The annual paddy straw production in Odisha is approximately 6.23 million tonne in 2009-10. The annual requirements for the current populations of swamp buffaloes and cattle are therefore 1.53 million tonne and 8.9 million tons respectively and a total requirement of 10.5 million tonne.
The present paper has been divided into five sections including the present one. Section II discussed the background of livestock and dairy sector in Odisha while data and methodology explained in section III. Output of the feeding paddy straw on livestock productivity has been discussed in section IV. Section V concludes.

2. Background of livestock and Dairy Sector in Odisha

Agriculture and allied sub-sector (animal husbandry, fisheries and forestry) is the mainstay of the state’s economy as it accounts for about 19 per cent of State’s Gross Domestic Product (SGDP), while employs 60 per cent of total workforce. Animal husbandry is an important source of livelihood for rural population and it works as insurance during distress period -80 per cent of rural households depend on livestock and draw about 30 per cent of their annual incomes. Further, 85 per cent of livestock are owned by the landless, marginal and small holders. Of the total livestock population, bovines account for 65 per cent and milk from cattle and buffaloes is one of the most important livestock products, contributing over 33 per cent to the value of all livestock production (Government of Odisha, 2011). According to 2003 livestock census, Odisha contributed about 4.82 percent livestock population in the country compared to 12.06 percent in Uttar Pradesh, 10.13 percent in Rajasthan and 8.58 percent in West Bengal. Though the trend of livestock population has been increasing since 1982, it has not been consistent. It was observed that compared to 2003 census, the livestock population has decreased in 2007 by 10 million. It could be due to decline in draught animal power; however, it needs more scrutiny.

Overall, Odisha’s dairy sector is poorly developed in comparison to most other Indian states in terms of milk production and marketing. Odisha was ranked 16th in milk production during 2004-05. Odisha contributes less than 2 per cent of the total Indian’s milk production thought it has increased from 1,651 TMT in 2009-10 to 1,670 TMT in 2010-11. Milk production is dominated by mixed farms with very small and marginal operational holdings (less than a hectare). These account for more than 80 per cent of the state’s milk production. Thus development of the dairy sector in particular would improve the livelihood status in the economy and decline the poverty rate. However, considering the importance of the livestock sector in Odisha, it has been neglected both by state and central government. For instance, the share of animal husbandry in the total state budget has been continuously declining over the last years from 1.3 per cent in 1995 to approximately 0.5 per cent in 2001-02. The declining public expenditure on this sector has had a negative impact not only on livestock productivity growth but also on the milk marketing system.

Though milk production has doubled during the period 1994-95 to 2004-05, the per-capita availability of milk is still less than half the national average and in 2011-12 the availability is 112g vs 290g. Dairy development activities are undertaken mainly through Animal Resource Development department and
Odisha State Co-operative Milk Producers Federation Ltd. (OMFED).

Recently, two private dairy firms have been involved to bring the efficiency in dairy milk marketing in Odisha. Out of total milk production, 30 per cent is retained for home consumption while 70 per cent is marketed through the different informal and formal channels; only 8 per cent of milk is marketed through formal channel (Saha et al., 2002).

3. Data and Method

Two stage sampling method has followed to select 250 dairy farmers from 12 villages from Puri, Bhadrak and Mayurbhanj district of Odisha state for the experiment, lasting 80 days. Feeding of maize of Stover was promoted in Mayurbhanj while feeding chopped paddy straw promoted in Puri and Bhadrak districts. First villages were selected based on dairy cattle population and milk market. After selection of villages, 20-25 farmers having 1-2 dairy cattle were selected from each village. One cattle was selected from each farmer for better monitoring.

The experiment period was divided into four phases—pre-deworming without chopping-I, deworming period-II, period with feeding chopped straw and without mineral mixture-III and period with feeding chopped straw with mineral mixture-IV.²

An attempt has been made to analyse the nutrient content and in-vitro digestibility of different varieties of paddy straw available in Odisha. These straw samples were analysed at ILRI laboratory, Hyderabad. The lab analysis shows no significant variations like energy, minerals Neutral detergent fibre,

² This area specific mineral mixture has been developed by OUAT.
Preparing chopped straw for feeding

Animal taking chopped paddy straw with Mineral mixture

Acid detergent fibre etc. The variety Pooja and Swarnamasuri having high silica content and the in vitro dry matter digestibility was less than other varieties. Table 2 reports the characteristics of sample farmers and dairy animals. Average age of farmer is found to be higher in Puri followed by Bhadrak and least in Mayurbhanj. Education pattern of the farmer shows that farmers in Bhadrak have higher education followed Puri and least in Mayurbhanj. This result also supports the education patterns of Odisha. It is well known that livestock sector is well developed compared to Bhadrak and Mayurbhanj. Average average age of experimental cattle is found to be lower in Puri compared to Bhadrak and Mayurbhanj. Similarly, the average lactation of cattle is lower in Puri and Bhadrak compared to Mayurbhanj.
An attempt has been made to find out the share of crop residue (dry fodder), green fodder and concentrated in total feed intake of dairy animals over different seasons and presented Table 3. Farmers give different feed to dairy animals i.e. chopped rice straw, un-chopped rice straw, green grass, home grown black gram and green gram. Among different feed intake un-chopped rice straw consume more followed by chokodo (Wheat bran) and least grass over season. It is surprise to know that very negligible amount of chopped rice straw is feeding to cattle, while it is necessary.

Table 3: Feeding pattern among sample dairy animals across season.

<table>
<thead>
<tr>
<th>Feed type</th>
<th>Summer</th>
<th>Rainy</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy straw[kg/d]</td>
<td>6.6</td>
<td>5.8</td>
<td>6.6</td>
</tr>
<tr>
<td>Cultivated un-chopped grass[kg/d]</td>
<td>1</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Wheat bran (Chokodo) [kg/d]</td>
<td>2.8</td>
<td>2.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Rice bran[kg/d]</td>
<td>1</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Compound feed[kg/d]</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Black gram[kg/d]</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Other-Concentrate [kg/d]</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
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</table>

4. Result and Discussion

4.1 Availability of nutrients

The average digestible crude protein (DCP) available in 12 villages of the three districts was 0.28 kg against the requirement of 0.40 kg/day which is around 29% deficit. By feeding chopped straw in Puri and Bhadrak district no improvement of available DCP was seen as paddy straw contain zero DCP, but there was improvement of available DCP upto 13% more in Mayurbhanj district where maize Stover was replaced by paddy straw.

Similarly in case of Total Digestible Nutrients (TDN) there was a deficit of more than 23% with regard to requirement which was improved to 14.40% in the animals of the three districts. It was seen that in Mayurbhanj though the availability vs requirement was quite high before feeding (30.46%) after
feeding of chopped green maize stover
the gap was reduced to only 13.90%. It
was found that both protein and energy
available to the animals was increased by
feeding chopped green maize Stover.
Marginal improvement (5-6%) of energy
availability was observed by feeding
chopped paddy straw vs unchopped one.

4.2. Impact of chopped straw and
maize Stover feeding on milk yield and
Fat%  

The average milk yield of the animals
in Puri and Bhadrak do not vary much -
6.06 and 5.47 l/day in Puri and
Bhadrak respectively at the beginning of
the experiment. But in Mayurbhanj the
average milk yield was 2.87 l/day, even
in some villages the yield was around 1 l/
day. After deworming, milk yield has
increased about 100-150 ml but not
statistically significant. But after
feeding chopped straw without and with
mineral mixture there was significant
increase of the milk yield of the animals
of 470 ml and 660 ml respectively. In
Mayurbhanj, milk yield has increased by
250 ml and 410 ml respectively in four
villages where farmers have indigenous
cattle. However, milk yield has increased
by 730 ml to 970 ml among farmers
having crossbreed cattle by feeding
chopped maize stover in comparison to
unchopped paddy straw. This is because
of the availability of higher energy
through maize Stover which has better
digestibility that reduced the energy
required for mastication and rumination.
No significant difference was observed
between with and without mineral
mixture. The average milk butter fat and
SNF % of the milk was not significantly
increased except one village on Puri and
the increase from 3.83 to 4.12 % was
seen.

4.3: Impact of chopped crop residue
feeding body weight of animals and
Serum Marco and Micro Mineral Status

The average body weight of the
animals before the trial was 278 kg in
Puri, 274 kg in Bhadrak and least in
Mayurbhanj (254 kg). After the feeding
the chopped paddy straw and also maize
stover, dairy animals have gained weight
by 8 to 10 kg milk. Highest weight gain is
observed in Bhadrak followed by
Mayurbhanj and least in Puri.
Though cattle in Puri are already well fed, feeding experimental trial has low impact on it. The dry matter (DM) intake of the animals was 2.74kg/100kg body weight and no difference was found among the villages.

There was also increase of the serum calcium status of the animals from 8.09-8.33 mg/dl with supplementation of mineral mixture and feeding chopped soaked straw. Similarly the serum phosphorus level was increased from 5.79 to 5.92 mg/dl but did not vary significantly (P>0.05). From the serum trace minerals study it was found that there was increase of the serum copper and zinc status in the animals after feeding the mineral mixture and no difference was observed in other trace minerals showing that the animals were

Table 6: Body Weight Changes in Experimental Animals

<table>
<thead>
<tr>
<th>District</th>
<th>Average initial weight (Kg)</th>
<th>Average Final body weight (Kg)</th>
<th>Change in body weight (Kg)</th>
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<tr>
<td>Puri</td>
<td>278.50</td>
<td>286.40</td>
<td>7.90</td>
</tr>
<tr>
<td>Bhadrak</td>
<td>274.52</td>
<td>284.74</td>
<td>10.22</td>
</tr>
<tr>
<td>Mayurbhanj</td>
<td>253.80</td>
<td>262.87</td>
<td>9.07</td>
</tr>
<tr>
<td>Mean</td>
<td>268.94</td>
<td>278.00</td>
<td>9.06</td>
</tr>
</tbody>
</table>
deficient in copper and zinc.

The serum calcium and phosphorus level of more than 40% of the dairy animals were below the critical level at the beginning of the experiment. Serum calcium and phosphorus are the two major minerals require for the production and reproduction of the dairy animals. Deworming do not improve the status the minerals. But by feeding chopped straw soaking with water, serum calcium level has increased to 8.25 mg/dl from 8.09 mg/dl in Puri district. However, no significant increase the serum calcium level in Bhadrak and Mayurbhanj.

Addition of mineral mixture in the processed crop residue significantly increased the serum calcium level in all the districts from 7.61 mg/dl to 8.0 mg/dl. Similarly the phosphorus level of the animals increased from 5.39 mg/dl to 5.73 mg/dl in the mineral mixture supplemented period. The calcium and phosphorus content of the straw samples varied 0.36-0.43 and 0.04-0.08% respectively which was analysed in the laboratory of Animal Nutrition. The total oxalic acid content of the straw 1.04-1.4% which was reduced to 0.47-0.58% after 4 hours soaking. That shows that more than 50% of the oxalic acid was removed when soaked in water. Though paddy straw contains calcium but the availability is hampered by presence of oxalic acid which on soaking and draining removed the oxalates that helps to increase the calcium status. Secondly the source of phosphorus for the area specific mineral mixture was DCP which is a better source and the availability to the animals is higher that helped to improve the serum calcium and phosphorus status of the animals.

Table 7: Effect of Processed Crop Residue feeding with and without Mineral mixture on Serum Macro Mineral Status

Table 8: Effect of processed Crop Residue feeding with and without mineral mixture on serum micro mineral status

The serum glucose and protein show the energy and protein status of the animals. The animals in the present conditions have lower glucose level in comparison to other parts of India.
might be due to high paddy straw based ration which contain less TDN in comparison to green fodders. More than 35% of the animals have low energy and 29% of the animals have shortage of protein. Feeding chopped paddy straw with mineral mixture supplementation increase the glucose status from 52.17

An attempt has been made to examine impact of feeding crop residue on serum micro mineral status of animal. As far the serum micro mineral status is concerned more than 32 % of the animals were deficient of copper and Zinc. Copper and zinc play a vital role for reproduction and immunity of the animals. Both deworming and feeding chopped straw did not improve the status of the micro mineral status. By feeding mineral mixture with chopped straw significant improvement of the serum copper status from 0.55 ppm to 0.67 ppm and the zinc from 0.76 ppm to 0.89 ppm was observed.

Table 9: Effect of Processed Crop Residue feeding with and without Mineral mixture on Serum Metabolic status of Animals

<table>
<thead>
<tr>
<th>District</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
<th>Phase IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cu (ppm)</td>
<td>Zn (ppm)</td>
<td>Cu (ppm)</td>
<td>Zn (ppm)</td>
</tr>
<tr>
<td>Puri</td>
<td>0.57 b</td>
<td>0.74 b</td>
<td>0.61 b</td>
<td>0.79 b</td>
</tr>
<tr>
<td>Bhadrak</td>
<td>0.54 b</td>
<td>0.78 b</td>
<td>0.55 b</td>
<td>0.78 b</td>
</tr>
<tr>
<td>Mayurbhanj</td>
<td>0.54 b</td>
<td>0.76 b</td>
<td>0.54 b</td>
<td>0.78 b</td>
</tr>
<tr>
<td>Mean</td>
<td>0.55 b</td>
<td>0.76 b</td>
<td>0.57 b</td>
<td>0.78 b</td>
</tr>
</tbody>
</table>

Table 9: Effect of Processed Crop Residue feeding with and without Mineral mixture on Serum Metabolic status of Animals
mg/dl to 56.11 mg/dl in the three districts that may be due to less energy expenditure for mastication and by feeding the chopped straw with concentrate mixture in the same bowel acts as a complete feed for animals leads to better rumen fermentation and better utilisation of straw. The protein level of the animals in Puri and Bhadrak did not improve significantly but in Mayurbhanj by feeding chopped green maize stover replacing paddy straw improved the serum protein levels.

4.4. Cost and Return in feeding of Chopped Paddy Straw

An attempt has been made to estimate the cost and benefits of feeding chopped maize stover and paddy straw without changing in feeding regimes of the animals. Assume the cost of chaff cutter 18,000 INR having a life span of 15 years, the depreciation comes 1200 INR per annum. The farmer can chop the straw/stover for a fortnight by operating the machine for 30 minutes to feed an animal. The electricity and other miscellaneous charges will be 292 INR and 220 INR per annum respectively. Total cost of feeding chopped maize Stover or paddy straw to a dairy animal will 1747.5 INR per annum. It was earlier observed the increase in milk yield by 0.450 ml after feeding chopped maize stover or paddy straw to 164 litres per annum. The average milk price is 24 INR/litre. Total income by adopting this method will be 5767 INR per annum/animal and the net income will be 4019.5 INR.

Table 10: Cost-Benefits of Feeding Chopped Paddy Straw/Maize stover

5. Conclusion

Feeding to chopped paddy straw and maize stover improved the milk yield, serum calcium and energy status of animals. Supplementation of mineral mixture to chopped crop residue improved the serum micro mineral status of the dairy animals. Feeding chopped maize stover proves to be better than paddy straw that should be utilized by the dairy animals for better production and health of the animals. A farmer is able to add an additional of 4019 INR income to his/her total annual income. It is recommended that feeding of chopped straw and maize stover along with mineral supplementation should be practised for better production and mineral status of animals. Steps should be taken to promote this practice for better and efficient
utilization of crop residues. This will provide a space for hired availability of straw.

References

Ration Balancing Programme:
An Approach to Educate Milk Producers on Balanced Feeding

Dr. Padam Veer Singh
NDDB, Patna

There is evidence to show that when a dairy animal is fed a balanced diet, it receives the required nutrients to produce milk commensurate with its genetic potential. Research and field trials indicates that this approach to feeding has the potential to increase milk yield, reduce cost of milk production, and contribute to reducing methane emissions. Milch animals are usually fed one or two locally available concentrate feed ingredients, grasses and crop residues. This often leads to an imbalanced ration - resulting in proteins, energy, minerals and vitamins being either in excess or deficient. Imbalanced feeding adversely impacts not only the health and productivity of animals but also affects income from milk production since an estimated 70 percent of the total cost of milk production is contributed by feed.

Therefore there is a need to educate milk producers on feeding balanced ration to their animals so that the nutrients required by their individual milch animals is fulfilled in an optimum manner, thereby improving milk production efficiency and the economic return.

Ration Balancing Program (RBP) under National Dairy Plan I plans to cover about 2.7 million milch animals in 40,000 villages using about 40,000 local resource persons (LRPs) who would be identified, trained and supervised by existing dairy cooperatives and producer companies. The project will finance the training costs, necessary equipment, and a modest monthly stipend for the LRPs on a tapering basis for about two years. Thereafter, the LRPs would be expected to earn a self-sustaining income from the commission through sale of area specific
mineral mixture (ASMM) and other nutraceutical products.

The project aims to demonstrate a new approach to extension by underlining the importance of unique identification of animals, their performance measurement and advisory support at farmer’s doorstep. It is envisaged under the project that each animal covered under RBP would be uniquely identified with an ear tag so as to enable monitoring of its productivity as well as efficiency of RBP through data recording system. Proper and effective training is the key for successful countrywide implementation of ration balancing programme (RBP) envisaged under NDP I. The technical officers, animal nutritionists and trainers of end implementing agencies (EIAs) would be trained at NDDB who in turn would impart training to local resource persons (LRPs) at EIA level.

Trained LRPs will provide advisory services to dairy farmers feeding balanced ration to their animals. LRPs would also educate milk producers on the latest technologies such as feeding milch animals with bypass protein, bypass fat, ASMM, treated or enriched crop residues etc. Besides, milk producers would also be educated on importance of drinking water, proper mangers for feeding the animals, significance of colostrum feeding to newly born calves, chaffing of fodder, de-worming, vaccination, timely insemination etc.

In the state of Odhisa, ration balancing programme is being implemented by Cuttack, Puri, Samaleswari, KMNR, and Balasore & Bhadrak Milk Union. It is envisaged to implement the programme in 1000 villages covering atleast 73000 milch animals details mentioned below:

At present, around 496 LRPs in 452 villages are providing ration balancing advisory services to 18,423 farmers for 21,549 animals.

Other benefits appreciated by the farmers through this programme are reduction in wastage of roughages, lesser incidence of metabolic disorders along with improved reproductive efficiency along with efficient use of available feed resources.

Pashu Poshan Android Application:

To popularize ration balancing among farmers the National Diary Development
Board (NDDB) has developed an android software "PASU POSHAN" for dairy farmers that can be used on phones as well as tablets. With the help of this software balanced ration is formulated while optimizing the cost considering animal profile profile, i.e. cattle or bufflo, age, milk prductio, milk fat, and feeding regime etc. Milk producers are advised to adjust the quantity of locally available feed ingredients offered to their animals along with mineral mixture to meet the nutrient requirement of animals as per production. The application can be downloaded from http://inpah.nddb.coop or from Googleplay store.

Process: First has to register himself by providing his/her details and create user ID and Password, with his user ID and password, with his user ID and password can open the application. Now 12 digit ear tagged animal need to be registered in the application and after registration ration can be balanced by giving input of feed items offered. This "PASU POSHAN" application would enable dairy farmers to balance the ration of their animals themselves to optimize cost of feeding.
Feed and Fodder Availability at Farmers' Level: The Study of Puri, Bhadrak and Mayurbhanj District of Odisha

Braja B Swain\(^b\), Dhiraj K Singh\(^b\)
P K Sahoo\(^b\), Nils Teufel\(^b\), N Panda\(^c\) and Lucy Lapar\(^b\)

1. Introduction

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 the developing world, 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 known 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.

For improving the livestock productivity, there needs to increase the availability of quality feed at farmers 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 India especially in Odisha should be based on the specific conditions of each agro-ecological zone. Different ecological zones (i.e. arid, semi-arid and sub-humid) will require different research based approach.

\(^a\) This paper is part of the CSISA project funded by Melinda Bill gates and USAID
\(^b\) International Livestock Research Institute (ILRI), New Delhi
\(^c\) Associate Professor, Department of Animal Nutrition, OUAT
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, the present study would like to examine the availability of feed at farmers' level using the Feed Assessment Toll (FEAST) developed by ILRI. The FEAST described here is to offer a systematic and rapid methodology for assessing feed resources at site level with a view to developing a site-specific strategy for improving feed supply and utilization through technical or organizational interventions.

2. Data and Method

The main data source of the study is based on primary survey of 177 households from 15 villages of three districts i.e. Puri, Bhadrak and Mayurbhanj. Simple random sampling has followed to select the households. Three districts were selected purposively based on the milk market situation -Puri is considered as high milk market zone, while Bhadrak is medium market zone and Mayurbhanj is low milk market zone. Villages were selected based on their milk production and dairy population. From each district, five villages were selected. After selection of villages, randomly 10-17 households were surveyed those have large ruminants. This selection procedure allows including part of the diversity of households within villages, while still being able to compare households and villages from different sites. A well-structure questionnaire was developed to collect information on feed and fodder availability at farmers' level. The survey questionnaire included: i) basic household information; ii) feed availability; iii) involvement of family member in collection of fodder and grazing cattle and iv) sources of purchasing feed and livestock management. The paper presents a descriptive and comparative analysis of diverse mixed-farming systems across three sites in terms of feed availability. Simple cross tabulation method is used to analyse the data.

3. Result and Discussion

3.1. Livestock holding pattern and feed intake

Table 1 depicted the livestock structure across three districts. We have converted the livestock holdings to total livestock unit (TLU)\(^1\). Among large ruminants, local cattle are the main livestock breed in Bhadrak where TLU is higher for local cattle (1.0) followed by Mayurbhanj where TLU is 0.8 and least in Puri. Coming to crossbred, TLU is found to be higher in Puri followed by Bhadrak.

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\(^1\) The concept of Tropical Livestock Units (TLU) provides a convenient method for quantifying a wide range of different livestock types and sizes in a standardised manner. For a number of applications there is a need to use a common unit to describe livestock numbers of various species as a single figure that expresses the total amount of livestock present - irrespective of the specific composition. In order to do this, the concept of an "Exchange Ratio" has been developed, whereby different species of different average size.
and least in Mayurbhanj. It shows that crossbred cattle holding size per household is higher in Puri and lowest in Mayurbhanj. This result is confirmed to the state livestock holding size. It is surprising to know that we have not found the presence of buffalo population from our sampling in Bhadrak and Mayurbhanj, where it is only 0.5 TLU size in Puri. It is true that cattle are the most commonly kept species, but remaining 35 per cent of livestock population, which comprises sheep, goats and pigs are kept by a large number smallholder from the bottom end of the poverty spectrum. From our survey, most of households in Mayurbhanj are keeping small ruminants (e.g. goat and poultry), while it is 50 per cent in Bhadrak and even very low in Puri. The TLU result indicated that Mayurbhanj has highest TLU followed by Bhadrak and lowest in Puri. It shows that where large ruminant plays major role in improving livelihood, small ruminants have negligible role.

Table 1: livestock holding structure (TLU)

<table>
<thead>
<tr>
<th>Spices</th>
<th>Puri</th>
<th>Bhadrak</th>
<th>Mayurbhanj</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle, local</td>
<td>0.6</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Cattle, crossbred</td>
<td>0.9</td>
<td>0.6</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Buffalo, local</td>
<td>0.5</td>
<td>0.0</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Other</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

An attempt has been made to examine the share of dry fodder, green fodder and concentrated in total feed intake across district. Feed intake reported here based on the farmers observation. The descriptive statistic shows that average intake by a diary animal is higher in Puri followed by Bhadrak and Mayurbhanj. Among different feed, crop residue especially paddy straw plays an important role, which constitute 40-48 per cent of total feed intake. After crop residue, concentrate second important feed in Puri and Bhadrak while it is grazing in Mayurbhanj. In Puri and Bhadrak, grazing has very less role in livestock feeding. However, fodder crops and collected grass has also small contribution to total feed intake in Bhadrak and Puri. Fodder crops contribute 12 and 7 per cent of total feed intake by a dairy animal in Bhadrak and Puri respectively. Overall, after dry fodder, concentrate constitute second important feed followed by grazing and least depended on fodder crop.

Table 2: Feeding pattern across districts

<table>
<thead>
<tr>
<th>Feed type</th>
<th>Puri</th>
<th>Bhadrak</th>
<th>Mayurbhanj</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>CropResidue</td>
<td>48</td>
<td>40</td>
<td>48</td>
<td>45</td>
</tr>
<tr>
<td>FodderCrops</td>
<td>6</td>
<td>11</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CollectedGrass</td>
<td>7</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>ConcentrateFeed</td>
<td>34</td>
<td>26</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Grazing</td>
<td>5</td>
<td>11</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

3.2 Type of feed purchased and fodder crops grown by farm households

Table 3 shows the percentage of share of different feed purchased by a household in three districts. The descriptive statistics indicated that there is variation in feed purchased by farm households. In Puri, farmers buy higher percentage of chokodo followed by paddy straw and then OMFED concentrate feed. While it is other feed (mustard cake, groundnut cake, fodder
and others) is major feed purchased by households in Bhadrak and Mayurbhanj. It is surprise to know that farmers in Mayurbhanj buy 21 per cent of chokodo from market followed by paddy bran. Paddy bran is found to be very less important in Bhadrak and Puri. We have not found any purchase of maize grain by Puri farmers while it constitutes 16 per cent in Bhadrak and 11 percent in Mayurbhanj.

Table 3: Percentage share of different feed purchased by a household across district

<table>
<thead>
<tr>
<th>Type of feed</th>
<th>Puri</th>
<th>Bhadrak</th>
<th>Mayurbhanj</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chokodo</td>
<td>27.5</td>
<td>7.7</td>
<td>20.7</td>
<td>18.63</td>
</tr>
<tr>
<td>Paddy Bran</td>
<td>8</td>
<td>8</td>
<td>15.2</td>
<td>10.4</td>
</tr>
<tr>
<td>Paddy Straw</td>
<td>24.3</td>
<td>1.5</td>
<td>0</td>
<td>8.6</td>
</tr>
<tr>
<td>Wheat Bhusa</td>
<td>11.6</td>
<td>11.5</td>
<td>2.7</td>
<td>8.6</td>
</tr>
<tr>
<td>Commercial Feed</td>
<td>4.6</td>
<td>0.9</td>
<td>0</td>
<td>1.83</td>
</tr>
<tr>
<td>OMFED Feed</td>
<td>20.3</td>
<td>15.3</td>
<td>0</td>
<td>11.87</td>
</tr>
<tr>
<td>Maize Grain</td>
<td>0</td>
<td>15.6</td>
<td>11.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Others</td>
<td>3.7</td>
<td>39.5</td>
<td>50.3</td>
<td>31.17</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

An attempt has been made to identify number of farmers are growing what types of fodder across district and presented in table 4. Overall, 19 per cent of sample households are growing in these three districts. It is surprise to know that around 53 per cent of sample households in Bhadrak are growing fodder grass while it is only 7 per cent in Puri and no households are growing in Mayurbhanj. Among different variety of fodder grass, Napier is most important grass in Bhadrak and also in Puri followed by maize in Bhadrak and beans in Puri. Only 2.8 per cent of farmers in Bhadrak are growing both jowar and barsim. Higher fodder grown in Bhadrak could be the effort of lower of officer and ILRI’s intervention.

Table 4: Fodder crops grown farm household across three districts

<table>
<thead>
<tr>
<th>Type of fodder</th>
<th>Puri</th>
<th>Bhadrak</th>
<th>Mayurbhanj</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jowar</td>
<td>0 (0.0)</td>
<td>2 (3.8)</td>
<td>0 (0.0)</td>
<td>2 (1.13)</td>
</tr>
<tr>
<td>Barsim</td>
<td>0 (0.0)</td>
<td>2 (3.8)</td>
<td>0 (0.0)</td>
<td>2 (1.13)</td>
</tr>
<tr>
<td>Napier</td>
<td>4 (11.5)</td>
<td>6 (11.5)</td>
<td>0 (0.0)</td>
<td>10 (5.65)</td>
</tr>
<tr>
<td>Maize</td>
<td>0 (0.0)</td>
<td>5 (9.6)</td>
<td>0 (0.0)</td>
<td>5 (2.82)</td>
</tr>
<tr>
<td>Owts</td>
<td>0 (0.0)</td>
<td>2 (3.8)</td>
<td>0 (0.0)</td>
<td>2 (1.12)</td>
</tr>
<tr>
<td>Beans</td>
<td>2 (1.9)</td>
<td>1 (1.9)</td>
<td>0 (0.0)</td>
<td>3 (1.69)</td>
</tr>
<tr>
<td>Others</td>
<td>0 (0.0)</td>
<td>10 (19.2)</td>
<td>0 (0.0)</td>
<td>10 (5.65)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (6.9)</td>
<td>28 (53.8)</td>
<td>0 (0.0)</td>
<td>34 (19.29)</td>
</tr>
</tbody>
</table>

It was observed that grazing and also collected fodder grass constitutes the major share of total feed intake by diary animals. In this section, the study has tried to examine the involvement male and female member of the households in collection of fodder. Low level of involvement of male member of the household in collection of fodder compared to female member of the household. Average less then hours is given by male member per day while female member are giving more than 1 hour a day. Time spent for collection of fodder increases in month of June by male while it is month of May for female member of the household. It is noted that male members the household spent more time from January to June compared to
female member while female member spent more time from the month of June. This could be the fact that male member of the household involved in agricultural activities from month the month June.

*Figure 1: Male and Female member involved in collection of fodder grass across the Month*

Availability and accessibility to feed is the main driver of livestock development in the state. As we have discussed earlier, feed contributes 70 per cent of total cost of livestock rearing. Research has been shown that cattle with having better feed have higher milk yield as well better productivity. The study has attempted to examine the feed availability at farm level presented in figure 2. The statistics shows that farmers in Bhadrak and Puri have better access to feed compared to farmers in Mayurbhanj. From the month of January to June, farmers of Puri have better access to feed while farmers in Bhadrak have better access to feed from July to December. This could be fact that farmers in Bhadrak have better access to grass from road side and grazing land. Farmers of Mayurbhanj faced most difficult to access from the month of February to June.

***3.4. Feed and water Access by farmers across the Month***

Availability and accessibility to feed is the main driver of livestock development in the state. Countries with high rainfall and better accessibility to water tend to be richer and countries with low level rainfall are associated with lesser economic prosperity. Thus water plays an important role in human development. Figure 6 contains the access to water for livestock across different month. Similarly the feed, farmers Mayurbhanj have difficulty to access the water compared to other district. Most difficult observe during January to June.

***4. Conclusion and Recommendation***

Crop residue mostly paddy straw constitutes 40-49 per cent of total feed intake by an animal. Farmers mostly depend on market and OMFED for concentrate feed where market has developed, however, home based feed plays a major role in less developed economy i.e. Mayurbhanj. Higher proportion of farmer in Bhadrak is growing fodder crops compared to other sample districts. From the month of...
January to June, farmers of Puri have better access to feed while farmers in Bhadrak have better access to feed from July to December.

Having importance of feed and fodder for improving productivity, there has been not much attention given by policy makers as well government. To improve the availability feed and fodder at farmers’ level following steps should be taken. 1) Increase the availability of quality feed and fodder planting material in right time; 2) subsidies should be given to farmers for cultivation of fodder and chaff cutter, 3) need to formulate feed and fodder group at Panchyat level with involvement of BVOS, VAS, SDVO and CDVOs, 4) Dairy loan should be supplemented with fodder cultivation and chaff cutter.

References


Effect of Sowing Methods on Green Fodder Yield

Dr V.K.Singh, TPE, BIRD Odisha
Sri Ankur Rai, FDO, Sonepur, Odisha

The BAIF Development Research Foundation have collaborated with the Odisha Livestock Resource Development Society & launched the Integrated Livestock Development Programme with financial support of the State Govt; since 2011. The project area spreads over 100 Cattle Development Center in far off places of 10 district & 25 Goat Development Center in 5 district. The programme focused for crossbreeding of the large animal & upgradation of small animals along with fodder production & effective utilization of the available crop residue. Low fodder production and lesser feed availability are the major limiting factors for increasing livestock productivity in Odisha & particularly in the project operational area. Improvement in livestock production depends on the proper quality and quantity of feed & fodder.

The Cross bred livestock need a constant supply of fresh forage. Berseem & Oat are annual, cool season forage crops. Due to the extra ordinary regenerative power, berseem gives several cuttings during its growing season and supplies nutritious, palatable and succulent forage for animals. Normally 4-6 cuttings of berseem & 2 cuttings of Oat are taken. Berseem is mostly fed as green & Oat can also be converted to hay, as the seasonal conditions permit. Feeding green plays an important role in farm-economy but the practices of obtaining 4-6 cuttings result in exhausting the root reserve and nutrients in the soil.

Broadcasting and line methods are used for sowing berseem and Oat but broadcast method is used more commonly by farmers. Sowing of berseem / Oat by broadcast & line in different proportions was taken up to study the yield & nutritional quality under different proportion & duration of cutting which is also very important practice for increasing the biomass yield & nutritional quality of berseem and oat. It was very much necessary to study the effect of sowing methods on green fodder yield & its nutritional value.
With the objective to study the effect of intercropping and different sowing methods of Berseem & Oat on green fodder yield & its feeding value in farmer’s field condition during Rabi season was initiated with farmer’s participation.

The Following Treatments for sowing were taken up.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Details of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Oat + Berseem broadcast</td>
</tr>
<tr>
<td>T2</td>
<td>Oat + Berseem line sowing (2:1) Row to row 25 cm</td>
</tr>
<tr>
<td>T3</td>
<td>Oat + Berseem line sowing (6:3) Row to row 25 cm</td>
</tr>
<tr>
<td>T4</td>
<td>Berseem broadcast</td>
</tr>
<tr>
<td>T5</td>
<td>Oat Broadcast</td>
</tr>
<tr>
<td>T6</td>
<td>Oat line sowing 25 cm</td>
</tr>
</tbody>
</table>

In the 1st year the sown plots were observed & recorded for:
- Green fodder yield per Sq Meter in Kg’s from each cutting.
- Dry fodder yield.
- Cutting was taken on 40 DAS, 70 DAS.

It was seen that
- The best combination of Oat & Berseem for fodder production is T3. Where 6 line of Oat is sown with 3 lines Berseem in alternate strips.
- The lowest green fodder yield is observed in T5 where Oat is solely sown in lines.
Interventions on forage crops in Odisha under AICRP

In Odisha, underfeeding of the livestock is the primary reason for decrease in production potential of the animals. The neglected calf management for generations also reduced the body weight of bullocks gradually. Low productivity of the indigenous, crossbred cows and buffaloes in the state is mostly due to lack of proper feeding material for them. The fodder availability in Odisha state is ill matched to the livestock population. There is almost deficit of 60% green fodder in the state. Under such a situation the All India Coordinated Research Project on Forage Crops aims to conduct Research and Extension work towards development and popularization of forage crops to meet the minimum requirement of nutritious fodder for the cattle population of the state of Odisha.

Significant Technologies developed by the center

**Crop Improvement**

Identification of promising genotypes for the State: The following are the important genotypes of different forage crops identified through evaluation at the center.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Promising Genotypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>African Tall, J-1006, GBM-84-2, EC-3155, EC-3121</td>
</tr>
<tr>
<td>Sorghum</td>
<td>MP Chari, Sudex Chari, PC-9, SSG 59-3</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>Giant Bajra, Raj Bajra Chari-2, RajkoBajra, JHPM-05-2, NDFB-2, DRSB-9</td>
</tr>
<tr>
<td>Coix</td>
<td>KCA-2, KCA-4</td>
</tr>
<tr>
<td>Teosinte</td>
<td>JHT-04-03, JHT-04-02, TL-1</td>
</tr>
<tr>
<td>Oat</td>
<td>Kent, JHO-822, OS-6, OL-125, JHO-851</td>
</tr>
<tr>
<td>Guinea Grass</td>
<td>PGG-9, PGG-14, PGG-619, PGG-617, Macuini, Reversedale</td>
</tr>
<tr>
<td>NBH</td>
<td>NB-21, CO-3, PBN-89, PBN-91, IGFRI-3, IGFRI-7</td>
</tr>
<tr>
<td>Cowpea</td>
<td>UPC-5286, UPC-4200, Bundel Lobia-1, EC-4216, UPC-626, UPC-611, UPC-618</td>
</tr>
<tr>
<td>Rice bean</td>
<td>Bidhan-1, KRB-1, BFRB-1, BFRB-2</td>
</tr>
<tr>
<td>Berseem</td>
<td>Mescavi, Bundel Berseem-2, Wardan, JB-2003-73</td>
</tr>
<tr>
<td>Lablab</td>
<td>LP-27, LPS-2</td>
</tr>
</tbody>
</table>
Crop Production

- In rain fed upland intercropping 2 rows of pearl millet in pigeon pea (75 cm row to row) is found to be most appropriate system producing green fodder equivalent yield of 463 q/ha, LER of 2.3 and NMR of Rs 27871/ha.
- In acidic soil, cowpea with 20 kg P2O5/ha combined with FYM @ 5t/ha produces highest green fodder yield of 198 q/ha.
- Intercropping of rice bean (fodder) with maize (grain) in 2:2 ratio coupled with application of lime @ 50% LR produces the most economic forage equivalent yield of 454 q/ha in acidic soil.
- Pearl millet (fodder) - Oat (fodder) - Maize + Cowpea (fodder) was found to be the best remunerative system under irrigated situation with NMR of Rs 57161 q/ha.
- Guinea grass can be profitably grown under shade of coconut trees with 75% above RD of fertilizer (GFY of 732.67 q/ha and NMR of Rs 46892/ha/year).
- For seed production of cowpea 30 cm row spacing was found superior (7.24 q seed/ha) as compared to 60 cm & 90 cm. UPC - 9202 was identified as the best entry.
- In ricebean 40 kg P2O5 produced highest green fodder yield of 170q/ha.
- In forage maize 80 kg N/ha produced highest green fodder yield of 274 q/ha.

Crop Protection

- Foliar spray of neem seed extract @ 3% at 30 and 45 days after sowing recorded maximum green and dry fodder in cowpea and maize intercrop (2:2) with lowest incidence of various diseases and insect pests.
- Seed treatment with thiram or Carbendazim or T. harzianum @ 3g/kg of seed is effective in reducing the root rot disease of oat caused by Sclerotium rolfsii (62.10%, 52.02% and 51.82%, respectively along with increase in GFY (45.08%, 30.50% and 26.45%, respectively) and NMR (89.9%, 60.46% and 47.89%, respectively).
- Seed treatment with Paecilomyces ceseliacinus@ 5g/kg + FYM @ 4t/ha followed by foliar spray of neem seed extract at 30 & 45 days after sowing produced maximum GFY, DMY & NMR in fodder cowpea & maize intercrops with least incidence of insect and...
diseases. Foliar spray of cattle urine + cow dung extract at 30 & 45 days after sowing was also equally effective.

- In fodder cowpea, seed treatment with *Pseudomonas fluorescens*@ 5g/kg seed + FYM @ 4t/ha along with foliar spray of neem seed kernel extract @ 3% produced maximum GFY & DMY. Seed treatment with *Trichoderma viridae* @ 5g/kg seed + FYM @ 4t/ha, seed soaking in pachagavya @ 10% for one hour followed by foliar spray with neem seed kernel extract @ 3% were able to give higher GFY & DMY owing to reduction in the incidence of maximum number of diseases and insect pests.

The research findings of the project are regularly intimated to the Department of Animal Husbandry and Veterinary Sciences. The project also conducts training programs in which the dairy and fodder farmers of the state are trained about the different management practices of the fodder crops. The project also conducts 30-40 frontline demonstrations on fodder crops like Hybrid Napier Bajra, Maize, Cowpea, Ricebean, Oat, etc. About 150 tribal farmers of Kenjhar, Koraput, Gajapati and Kandhamal districts have been trained and distributed planting materials of different fodder crops under Tribal Support Plan.

The project also provides technical support for maintenance and development of the fodder farm of Nandankanan Zoological Park and fodder development activities of Department of Forest in different districts of Odisha. The project also provides planting materials and seeds of fodder crops to many farmers, publishes extension bulletins and leaflets on fodder crops. The scientists of the project also regularly deliver talks on radio and TV to popularise the fodder cultivation in Odisha.

With these research and extension activities, the project is also in very good cooperation and collaboration with the Department of Animal Husbandry and Veterinary Sciences of Odisha, which ultimately helps in increasing the area, production and productivity of fodder crops in the state.
Steps for Improving the Feeding Practice of Green Fodder to Sustain the Dairy Production in Odisha

Dr. J.R. Pattanayak, Asst Director, Veterinary officers’ Training Institute (VOTI) LaxmiSagar, Bhubaneswar

An ideal fodder system is that which gives the maximum production of digestible nutrients per hectare or maximum livestock products from unit area. It should also ensure the availability of succulent, palatable and nitrogenous green fodder and for preserved fodder throughout the year. On the other hand, if we examine the land resources available for growing fodder and forage crops it is estimated the average cultivated fodder devoted to fodder production is only 4.4% of the total area. Similarly, the area under permanent pasture and cultivated wastelands is approximately 13&15 million hectares, respectively, where total area under forests is 2.51 crore hectares. All these resources are able to meet the forage requirement of the grazing animals only during the monsoon sessions. But, for the remaining periods of the year the animals have to be maintained on the crop residues or straws of jowar, bajra, ragi, wheat, barley etc. either in the form of whole straw or bhusa either supplemented with some green fodder or feed.

Fifteen percent of total world’s population lives in India while 16% Human population have to be survived and progressed on 2% of geopolitical area. Due to ever-increasing population pressure of human, arable land is used for food. As a result, less land left for fodder production.

Table 1: Fodder (Green & Dry) Production trend in India (million tones)
Table 2: Concentrate availability trend (Green & Dry) in India (million tons)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrate available</td>
<td>41.96</td>
<td>43.14</td>
<td>44.35</td>
<td>45.63</td>
<td>48.27</td>
</tr>
<tr>
<td>Concentrate required</td>
<td>117.44</td>
<td>120.52</td>
<td>123.59</td>
<td>127.07</td>
<td>130.55</td>
</tr>
<tr>
<td>Concentrate deficit</td>
<td>64.7</td>
<td>64.21</td>
<td>64.12</td>
<td>64.10</td>
<td>63.03</td>
</tr>
</tbody>
</table>

Source: Draft report of the working Group on A.H & Dairying for 5 yr plan (2002-07) (Govt of India, Planning Commission, 2001)

In Orissa, the estimated availability of green fodder & dry fodder per all sources is 16121.750 thousand MT and 31203.66 thousand metric ton respectively. The Present shortfall is 48.4% green fodder and 23.5% for dry fodder (Anon, 2010). Scientific Packages of practices in brief to be adopted in India as well as in Orissa state for increasing the fodder production with respect to cultivated fodder crops have been given in table 3.

Table 3: Summarized packages of Practices for fodder production

<table>
<thead>
<tr>
<th>Name of the crop</th>
<th>Soil</th>
<th>Sowing time</th>
<th>Seed rate /kg/ha</th>
<th>Mean spacing(cm)</th>
<th>Manuring Unit/ha</th>
<th>Harvesting Days</th>
<th>Fodder yield (Quintals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>Sandy loam</td>
<td>Apr-June (N)</td>
<td>40-45</td>
<td>25-30</td>
<td>FYM 25 tonnes N=50-60, P=20kg, K=20kg</td>
<td>70-80</td>
<td>350-450</td>
</tr>
<tr>
<td>Tower</td>
<td>Sandy loam</td>
<td>Mar-July (S)</td>
<td>40-50</td>
<td>25-30</td>
<td>FYM 25 tonnes N=60kg, P=20kg</td>
<td>80-90</td>
<td>300-400</td>
</tr>
<tr>
<td>Bajra</td>
<td>Sandy loam</td>
<td>Mar-Aug (N)</td>
<td>10-12</td>
<td>50-60</td>
<td>FYM 10 tonnes N=40kg, P=20kg</td>
<td>50-60</td>
<td>300-400</td>
</tr>
<tr>
<td>Oats</td>
<td>Sandy loam</td>
<td>Mid-Oct to Mid Nov</td>
<td>80-90</td>
<td>20-25</td>
<td>FYM 20 tonnes N=80kg, P=20kg</td>
<td>70-75 (Early cut)</td>
<td>400-450</td>
</tr>
<tr>
<td>Teasseine</td>
<td>Sandy loam</td>
<td>Mar-A Feb-Nov (S)</td>
<td>35-45</td>
<td>40-50</td>
<td>FYM 25 tonnes N=50kg, P=20kg</td>
<td>75-80 (1st cut 60-70, 2nd cut 60-70)</td>
<td>400-450</td>
</tr>
<tr>
<td>Hybrid Napier</td>
<td>Sandy loam</td>
<td>Mar-Aug (N)</td>
<td>127,780</td>
<td>20-20</td>
<td>FYM 25 tonnes N=40kg, P=20kg</td>
<td>250-300</td>
<td>2000-2500</td>
</tr>
<tr>
<td>Paragross</td>
<td>Sandy loam</td>
<td>Mar-Aug (N)</td>
<td>127,780</td>
<td>20-20</td>
<td>FYM 25 tonnes N=40kg, P=20kg</td>
<td>250-300</td>
<td>2000-2500</td>
</tr>
<tr>
<td>Rhodes gross</td>
<td>Sandy loam</td>
<td>Mar-Aug (N)</td>
<td>127,780</td>
<td>20-20</td>
<td>FYM 20 tonnes N=20kg, P=20kg</td>
<td>250-300</td>
<td>2000-2500</td>
</tr>
</tbody>
</table>
Crops and Cropping Pattern: Common cereal fodder crops like maize, sorghum, and oats are rich in energy and the leguminous crops like Lucerne, berseem and cowpea are good source of macro & micro-nutrients, so critical for rumen microbes as well as animal system. Grasses like Hybrid napier and Guinea are also known for high yields and new variety produce good quality fodder. Cropping activities go on year around in India provided water is available for crops. In North India, there are 2 distinct season, Khariff (July-October) and Rabi (October-March). Crops grown in between March-June are known as ZAID. These crops are are grown solely or mixed (mixing cropping) or in a definite sequencing (rotational cropping) or by two crops (double cropping) which may be grown in a year in sequence. Of late, the trend is even more than two crops (multiple cropping in a year). Fodder production for intensive dairy farming. An intensive dairy-farming needs uniform quantity of yielding crops throughout the year. The overlapping & the relay cropping are the most suitable production system for the type of farming. Overlapping System. In this system, a fodder crop is introduced in the field before the first crop completes its life cycle. The overlapping systems take the advantages of the growth periods of different species to ensure a uniform supply of green fodder throughout the year. One such system continues for three years. The best rotation in this system is Berseem + Japanese sarson-Hybrid.
Napier+coepea-Hybrid Napier; (Oct - Apr) - (Apr - June) - (Jun - Oct).

RELAY CROPPING: In relay cropping, the fodder crops are grown in succession i.e. one after another, the gap between two crops being very small. There is ample scope for increasing fodder production from the high input area either by growing high yielding fodder crops, single or in mixture. The growing of three or four successive fodder crops helps to boost fodder production per unit area.

Fodder Production In Aerable Farming: There is ample scope for cultivating short duration fodder crop; either single or in mixture with other crops during the gap period between two main cash crops. Two distinct fallow periods are available for raising short duration fodder crops provided adequate resources are available. In the case of the wheat - jowar rotation, gap periods between April and June & between Oct - Nov are available for each crop as fodder.

Fodder Production Under Dryland Farming: A large population of the area of our country is located in the dry-land regions. In these areas the farmers usually grow at least one crop in the Rabi season after conserving soil moisture. Thus there is a great scope for raising food crops under such situations. After harvesting the fodder crops such as Gram, Linseed, Barley, Wheat, safflower are raised on the conserved moisture.

Grass Legume Mixture: Are always desirable because of their complementary function providing nutritive succulent palatable forage for the growing animals. In addition, they are capable of creating much greater quantities of digestible dry matter and protein throughout the growing season than either component legumes maintain their quality better than grasses even at maturity, and being rich in protein, enhance the forage value, and also add substantially the much needed nitrogen to the soil; check soil erosion; resist the encroachment of weeds and withstand the variation of weathers better than the pure strands. Also helps in the spread of certain diseases.

Conservation of green Fodder: Conservation of green fodder is an effective way to regulate the supply of palatable and nutritious fodder during the lean periods when it is surplus. The green fodder, which gives abundant growth in monsoon can be conserved to make available in the lean period is post monsoon and summer months. The need for the conservation of fodder is more warranted in the drought prone where crop failures are frequent. Thus it is essential that surplus fodder should be conserved during the periods of excess growth, in the form of silage&hay

Silage making: Silage is the formatted feed resulting from the storage of high moisture crop usually green forages, under anaerobic conditions in a structure known as silo. Formation under anaerobic conditions preserves the nutritive value and enhances the keeping quality of the fodder. The processing of conserving green fodder in this way is termed as ensiling.

Crop suitable for silage making: Generally, the fodder crops rich in soluble carbohydrates and low to medium in protein content are ideally suitable for silage-making. A high content of soluble carbohydrates renders the material more palatable. Grasses and legumes are well suited for this purpose. Plants like Alfalfa, Sweet clover, Lucerne, Perennial ryegrass, and Fescue provide high-quality silage.

Crop rotation is an important tool in bringing a balance in the system of the growing animals and the soil. Crop rotation helps to break the cycle of pests and diseases, maintain soil fertility, and reduce the risk of soil erosion. It is a practice that involves growing different crops in succession on the same field or area.
Carbohydrate provides an excellent growth medium for the anaerobic bacteria to form abundant acids which increase the keeping quality of the silage. Thus maize, jowar, bajra, guineagrass, para grass & napier grass are highly suitable for making good quality silage. On the other hand, leguminous fodder which normally have high moisture & high crude protein and low soluble carbohydrate at the comparable growth stage, are not considered fit for silage making.

**Steps For Silage Making:** The fodder crops should be harvested and chaffed at the proper stage of growth (Flowering stage), so that moisture, protein & carbohydrate content are optimum for anaerobic formation. The green fodder should have an amount 30-35% per cent dry matter. This is achieved by wilting the crops for certain periods before filling the silo pits, if they have excess moisture, or by sprinkling a small of water on each layer of the chaffed material, if it has less moisture. In the case of Kutcha silo pits, their bottom & sides should be carpeted with dry grasses so as to make a 5-6cm thick carpet all around. This carpeting helps to prevent the direct contact between the freshly chaffed materials and the soil. The fodder to be ensiled should be chaffed in to small pieces, preferably 1-2cm long, either by the help of annually operated chaffed cutter.

The silo pit must be filled very quickly so that the material must be compacted in such away as to remove as much air as possible through constant pressing either by manual labour or with bullocks or tractor with combination of all there.

The exclusion of air causes efficient fomentation under anaerobic conditions. The height of chaffed materials should be about 1-2metres above the ground level. During the course of fermentation, the material gradually settles down. Urea & Molasses @0.5% and 5%, respectively of the chaffed material mixed with, or sprinkled thinly and evenly on different layers, if the chaffed materials happens to be very low in protein content, especially in the case of sugarcane tops & cereal fodders. After filling and compacting the materials carefully, the silo pits should be preferably is given a dome shaped appearance. Such facilitates the drainage of rainwater, which otherwise would enter the ensiled material, and deteriorate the quality. The ensiled materials is then covered with a polythene sheet or a tarpaulin all sides so as to protect rain & sun rays. After a week, the polythene sheet is then removed and the material is compacted again so as to consolidate the chaffed material & remove the air to the greatest possible extent. The polythene sheet is then placed back. However, if the polythene sheet is not available, a thick layer of straw is put on the chaffed material from all sides and over the straw, a thick layer of moist soil (10-12) cm is spread. The surface is covered in a mud plaster prepared by adding dung & water to the earth, in suitable quantities. This avoids the contact of atmospheric nitrogen with the ensiled material. Since atmospheric nitrogen, prevents fermentation under anaerobic condition. The chaffed materials ensiled
by the above procedure are ready for feeding to the livestock after 3 months. A silo pit is opened and the material is removed daily for feeding by exposing as little as surface of the ensiled as possible. This is done mainly to prevent the direct contact of the feeding material with sunlight & to prevent air-drying.

Silage can be fed in small quantities (4-5) kg per cow to start with and later the quantity can be increased to 15-20 kg so that the animal is able to adjust itself to the new feed. During an acute fodder scarcity when nothing is available for feeding, it has been reported that silage is able to meet the full requirements of the animal in respect of dry matter & essential nutrients.

**Silage quality:** The quality of silage is important from its color and odor. Good silage should be greenish or yellowish brown, with pleasant odor and possess a high acid content. On the other hand, if the silage has content of butyric acid is yellow & emits offensive odor or has become dark brown and gives out to pungent odor, owing to heating, it is poor silage, though it may be palatable to the livestock but it’s feeding value is poor.

**Very Good:** It is having acidic taste and odor, traces of butyric acid, molds; sliminess, showing a pH range of 3.5-4.2 and with ammonical nitrogen less than 10% of total nitrogen.

**Good silage:** Silage possessing acidic taste and odor, traces of butyric acid, pH 4.2-4.5 and ammonical nitrogen 20% of the total nitrogen.

**Fair silage:** Ensiled material with some butyric acid, a slight proteolysis some moulds, pH 4.8 and above and ammonical nitrogen 20% of the total Nitrogen.

**Poor silage:** It is having bad smell due to high butyric acid & high proteolyses may be infected with moulds. The pH is in between 4.5-4.8. Ammonical nitrogen is more than 20% of the total nitrogen.

**Types of Silos:** Different kinds of structures, varying in design and cost, are used for silage making and storage. The size and shape of the structures depend on the livestock strength, soil and financial inputs available with the livestock owners.

**Tower Silo:** Tower silos or pit upright silo are among permanent types & relatively costly they are constructed above the ground levels in the form of cylindrical towers. The diameter & height above the ground level in the form of cylindrical towers vary according to the needs. The loss of dry matter is 5-10%.

**Pit or Trench Silos:** Pit silos are less costly than the tower silos & are widely adopted for silage making. They may be pucca or kutchas depending upon the climatic conditions. Pits of desired size are dug in well drained soils. In the Katcha silos, the floor should be brick lined. When opened for feeding, a definite toplayer of silage (5-7) cm more is uniformly removed & feed daily, to prevent spoilage.

**Bunker Silo:** The silos are constructed on the surface of the ground & mainly consists of two retaining walls, 2-2.5 m high & with a slope 2-3 cm so as to make the silage settle tightly against them. They should always be built on firm soils having good surface and good drainage.
References:

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- Pathak, N.N and Jakhmola, R.C (1983) "Forage & livestock production", Vikas publishing House Pvt. Ltd, Ansari Road, New Delhi

Instant Feed for Dairy Animals

Ranjit Ekka,
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In the State of Odisha, paddy based farming system is predominant. The animal husbandry practices of Odisha also revolve around the paddy farming. Rice is the table food of most of the odishas families so as for the dairy animals of the State. The by-product of paddy can usually use as the cattle feed such as paddy husk (Kunda), Rice bran, paddy straw etc. On the nutritional point of views the by-products of paddy are poor in nutrient content, rather the paddy straw contain oxalic acid which is harmful for the cattle. With all short of demerits the paddy straw is the main sources of fodder for the State of Odisha. Looking into the above context the Directorate of Animal Husbandry & Veterinary Services, Odisha and Department of Animal nutrition, OUAT , Bhubaneswar design a instant feeding formula for paddy straw to adopt all over the State. Basing on the design a State Plan programme Viz. "Enrichment of crop residue" is going on the State.

Law grade roughages are characterized by low nitrogen, mineral and vitamin and high fiber and silica content. These associates low intake and digestibility. According to the paddy straw enrichment formula the paddy straw may be chaffed into small pieces (Preference will be given to chaffed straw) and was clean and soaked in water just before enrichment. The chaffed soaked paddy straw will be taken into the feeding trough where the different ingredients are mixed in the following proportion.

Requirement of ingredient for 10 Kg chaffed soaked paddy straw.
1. 150 gm Grind Maize
2. 150gm molasses/ jaggary / Raba gud
3. 100 gm Urea
4. 100 gm salt and
5. 200 gm Di- calcium phosphate

The prepared feed mixture can be fed immediately just after treatment / enrichment to the cattle. Initially it is advice to feed the livestock in small quantity and gradually in can enhance upto 5kg considering the body weight of the livestock. In this feed mixture the mineral mixture can also be added to
meet the mineral deficiencies of the cattle. This type of feeding of paddy straw is enabling the cattle to optimize the production potentialities, voluntary intake of the livestock will enhance, digestibility will increase. Further ensure good health to the livestock. By feeding such enriched feed the farmers will get benefited as the cost of production of milk will be reduced to a greater extent. Ultimately the livelihood standard of the farmer will be uplift to a remarkable state.

Following precautionary measure should be taken while taking enrichment of paddy straw.

1. The paddy straw should be free from fungal infection. The fresh clean paddy should be used.
2. Fresh clean water should be used for soaking of chaffed paddy straw.
3. Urea should not be used more than 1%.

Hence it is advocated to popularize enrichment of paddy type of feeding in the State of Odisha where paddy cultivation is predominant, side by side to wave out the malfunction of Oxalate in the straw.
Role of Women in Livestock Management in Odisha

Dairying is an integral part of household activity. It has several direct and indirect contributions for the growth of human society. Livestock rearing directly provides milk, curd, ghee to supplement nutritional requirement in food and for indirect benefit it provides manure for fuel and fertilizer, urine for religious/cultural activity and help in ploughing in the agricultural field. For the poor household livestock rearing is a major source of financial security in case of emergency. Starting from orthodox society to till date, the importance of livestock keeping especially dairy cows is widening its scope day-by-day. Ancient days livestock rearing was fulfilling food requirement, luggage carrying, transportation, protection and additionally carrying forward the religious and cultural practice by different group of people. In the modern industrial dominated society livestock plays a decisive role for sectoral development. Most of the people from less developed countries are very much dependent on livestock resource for their livelihood. India is a very good example of it.

Dairy animals are one of the most important forms of livestock. India plays a vital role in keeping dairy animal and its management in the world. It is seen that more than 50 percent of world’s buffaloes and 20 percent of cattle are available in India. Although dairy sector contributes 3.6% of country’s total GDP still it is the most single enterprises that contributes much in the total agricultural sector. (National Accounts statistics 2012, central statistical organization, ministry of statistics and programme implementation, GoI).

While a visible number of dairy animals have kept in Odisha to fulfil the religious and cultural need, their management and care is considered as the most difficult task by the farmers of our state. This kind of attitude is higher among the male than female. Male member consider dairy keeping is a time consuming dirty kind of thing, for which they mostly over look this practice. A sizable number of Odia male think
animals are the objects, which have no emotion, feeling and requirement like non-living beings. Contrary female members think animals as their children. They non-verbally talk many things with them, understand their problem and give necessary solution to their problem. So, most of the dairy activities like care, nurture, feeding and management are done by the female member of the house. Like the importance of agriculture for male in the outside livestock rearing is alike important for female.

Three major things such as feeding, watering, day to management, healthcare are required for livestock rearing, which is generally furnished by women. More than 80% of the the dairy management is done by women member in the family. For proper nutrition feeding of compound feeds is most important requirement. In this regard women personnel of the household make all the husk/bran, crop residue and other necessary ingredients together and provide timely for dairy feeding. Similarly regarding animal health women are more conscious than male. To keep their animal healthy women spare maximum time for shed cleaning and maintaining for hygiene. Under livestock management the things like proper milk collection, cleaning and sanitation of sheds, food arrangement, processing of milk products, protection from mosquito etc. are covered. These things are also done by the female member very carefully.

More than 80% of the farmers are in Odisha are small and marginal farmer. Lack of interest on livestock among men and lack of financial freedom among the female is not allowing for increasing herd size in Odisha. So the odia farmers are not getting much benefit by keeping animal. Even they are unable to think about dairy keeping for profit making. The four corner of the house is not allowing the female to think big regarding cattle rearing. They are not able to imagine for large animal herd, high milk production to fulfilling market need, more income for proper household management, and empowerment.

In order to meet the milk requirement of increasing population women are not empowered to adopt different modern technology like artificial Insemination for animal breeding feeding of green fodder, chaffing of straw and grass, mineral mixture, prevention of diseases by vaccination, etc. As the land for cattle grazing is declining significantly with increasing population, alternate technology like chopping of straw or grass, to reduce wastage of animal feed, growing of green fodder to maintain animal health and increase milk production is becoming essential now days. As straw is the staple fodder for the cattle proper utilization of this is very much necessary for growth and production. Chaffing of straw has a number of other advantages as it minimizes the loss of energy due to digestion, decreases digestion time and increase milk yield by preserving the energy of cattle.

More commonly male members of the family are not so much serious for their animal, so they do not focus on fodder, animal nutrition, health and its management. By which animals are suffering from malnutrition which is adversely affecting milk yield and
reproduction. As a result the per head milk production in Odisha (112 gram) is much less than other states like Punjab, Haryana, Gujarat etc.

For considering dairy keeping as a profitable profession through increased milk production the women of Odisha should come up by strengthening SHGs and women societies. They should be imparted more knowledge on the advantage of dairy cattle keeping and encouraged to increase their herd size. In addition to that the Women in Odisha should be strengthened for dairy management process like shed maintenance, hygiene, prevention from diseases, feed management and technological support like chaffing of straw and grass, growing of green fodder, etc. through proper training and demonstration. With government organization, all non-government organization and livestock research institutions are needed to think more to involve women for livestock development. By convincing the family members' congenial situation should be created for women to come up for participating in different training programmes and other livestock activities, to gain better knowledge and experience. Proper implementation of knowledge and experience will increase economic gain through high milk production, better management and increasing number of cattle, resulting women empowered and development.
Female farmer in Tribal region of Odisha, India enjoys better milk yield through improve feeding practice of maize Stover

Suchitra Behera, Mayurbhanj

Suchitra Behera is a forty-two-year-old dairy farmer from Amdubi village of Mayurbhanj district in Odisha, India. Farming is the main source of income in her village, where livestock plays a major role. Draft power remains the main means of land preparation in her area, since technology is still not widely used for farming. Suchitra is a member of Kala Mahajan Group, a self-help group for women, which allows her to draw money when she needs for farming expenses or for any other purposes. She has two daughters and one son. Even with only 7 years of education, she tries to educate her children by teaching them herself along with managing household.

She received training in dealing with in managing livestock, especially dairy animals, from a workshop facilitated by ILRI under the Cereal System Initiatives for South Asia (CSISA) project in her village. She is recognized as a promising dairy farmer by local animal husbandry department due to her keen interest and hard work.

Suchitra owns 9 cattle, 2 of which produce 9 litres of milk per day. One is dry, one is bullock and the rest are calves. These dairy animals are improved local cows. There are no milk cooperatives in her village, but there is a middleman who plays an important role in marketing milk. Out of the total milk produced, 80-90 percent is bought by the middleman at US$ 0.307 (Rs 20) per litre, and the remaining 10-20 percent is kept for household consumption.

'Milk is a fallback to crop failure and it improves nutrition of my family member. Every day, we have milk to drink even when it is too little to sell', says Suchitra.

Marketing of milk is a main problem for Suchitra. Due to lack of market and a milk cooperative, she is forced to sell milk to a middleman at a much lower rate. There is demand from her and other dairy farmers from this village to establish a dairy cooperative as well as a bulk cooling centre near the village.

Members of Suchitra's family have been rearing cattle for a long time, and three years ago they also started rearing...
crossbred cattle, thanks to her efforts.

**Waste not, want not: Feeding the whole maize plant to animals**

Feeding livestock is often a challenge in Amdubi village, Baripada block, Mayurbhanj district in Odisha. The plots of land are small as well steep and mostly devoted to growing rice paddies during the rainy season, maize and, to some extent, vegetables during winter. The cattle are fed at home until after harvesting when they are allowed to feed on the remaining straw in the rice fields. Sometimes, it becomes difficult for farmers to feed animals properly due to unavailability of feeds and lack of farmers’ resources to buy feeds from market regularly. They have to resort to feeding their livestock with broken rice and bran produced at home.

Although farmers of this village grow maize, they never feed maize stover to animals. Only green leaves of maize are fed to animals, sometimes and other parts of the plant are wasted. To maximize the benefits of maize plant as well as stover, ILRI, in collaboration with local animal husbandry staff (VS) and CSISA project staff, took the initiative of introducing the practice of feeding the whole maize plant to 20 dairy farmers. Within the CSISA project, ILRI introduced crop residue-based, especially maize stover, feeding strategies to improve milk production of dairy animals and provided the initial chopping machine.

**Before and after ILRI**

Prior to their ILRI training, farmers were feeding their animals un-chopped paddy straw, as well as maize leaves, which are difficult for the animals to digest and contain oxalic acid, which can be poisonous to cattle. Now farmers go to the village centre point where the machine is placed, but they get more chopped stover to feed their cattle, and only have to pay the maintenance cost of the machine sometimes. They have learned how to organize their day around the machine—often cutting the stover as well as straw three to four times a week.

For Suchitra, ILRI’s intervention through this CSISA project is a great benefit. She is able to feed her animals properly as well as save straw by half by feeding underutilized crop residue (maize stover) using less concentrate feed. Best of all, she and fellow dairy farmers are producing more milk. They feed the chopped stover to the animal in a bowl, which decreases the risks of contamination, improving the animal’s health in the process. The milk yield per animal has increased by 500 ml per day, making the economic benefits more visible and significant.

*International Livestock Research Institute (ILRI), New Delhi, India*
Sri. Niranjan Mohanty, living in the village Dahikhia of Kakatpur Block in Puri District (Odisha), after completion of Graduation in 2007 started a small diary unit as an unemployed youth in his village. He started the unit with one crossbred jersey cow. With the help of A.I programme the unit expanded 5 Crossbred Jersey Cows with a daily milk production of 50 Liters during the year 2011-11. At that time he was spending Rs.120/- per animal per day towards feeding cost and in return he was getting Rs.180/- from one milch animal. But the cost of treatment and payment to labour wage squeezed the profit margin and he had decided to shift his business from dairy to fishery. Then he excavated two ponds within his farm area. By that time to protect the bunds from erosion he decided to cover it with grass. Then he contacted with the local fodder officer as per their advice he covered the bunds with paragrass and CO$_3$ perennial fodder crops. After getting a good harvest of green fodder from the bunds and feeding to the animals he could able to reduce the cost of concentrate feeding. Again he made up mind to continue the dairy unit along with pishiculture. At that time, in the lunching year of R.K.V.Y. Fodder Programme, he was selected as a Lead Farmer. Gradually he increased the area under fodder and able to induce more milch cows. With the help of DEDS programme he obtained sanction of 10 cow unit. Now he is having 14 cows and daily collection of 150 liters milk. As reported by him now he is spending Rs.70/- on feeding of one milch animal per day and in return he is getting Rs.190/- from each cow. He is expanding the cattle shed and preparing to maintain 50 cow unit and ready to convert his entire 5 acres of land under fodder cultivation. Sri Niranjan Mohanty has started a Biogas plant that again reduces the cost of making Paneer and Ghee. He stated that with the balance ration and inclusion of green fodder in the daily diet the health condition of the cows are stable and infertility problem reduced. After getting profit he is now purchased one vehicle for transporting the milk and other milk products to the nearby sale centers so he is a successful dairy farmer and a role model in that area.
Success Story Of A Lead Farmer
Under RKVY Seasonal Fodder Programme During The Year 2013-14

Bidyadhar Sahu, Puri

Sri Bidyadhar Sahu of Balisahi in Begunia G.P of Gop block is a Lead Farmer selected under R.K.V.Y Fodder programme of that cluster. He has 4 Jersey C.B. Cows and two calves. Every day he produces 30 liters of milk and sold in the M.P.C.S. As a Lead Farmer he motivated the fellow farmers and persuades them for year round fodder production to reduce the milk production cost. During the year 2013-14, he has organized the farmer group and utilized the supplied seasonal fodder seeds and developed excellent fodder plots in the village. He has harvested 45 quintals of Maize + Cowpea fodder from 25 cents of plot and explained the benefit in terms of money saved from the concentrated feed. He has fed 4 cows and 2 calves for a month and could save 250 Kg. concentrate feed costing Rs.2500.00 while the total cost of cultivation was only Rs.500.00 for tractor
cultivation (as the seed and fertilizer were supplied from R.K.V.Y. Programme). So he got a straight profit of Rs.2000.00 in a month. Further he could sale 3 more liters of milk after 10 days of feeding green fodder.

The fellow farmers also derived that benefit and continuing the programme in both Kharif and Rabi season.
First Person: Strike Turns Farmer into Dairy Feed Businessman

Kishore Kumar

Guagadia village in Odisha produced an unexpected entrepreneur, when the workers of the feed supplier Orissa State Cooperative Milk Producers' Federation (OMFED) went on strike. Suddenly, Kishore Kumar, a small-scale dairy farmer, found himself asking, 'What on earth was he going to feed his cows?'

Mr. Kumar approached CSISA-ILRI staff for help. The ILRI team quickly arranged a training workshop for the farmers of Guagadia village. The training was organized in collaboration with the Department of Animal Nutrition, College of Veterinary Science & Animal Husbandry and the Odisha University of Agriculture and Technology (OUAT) and support from Directorate of Animal Husbandry, Government of Odisha. Farmers were taught how to prepare balanced concentrate feed, how to enrich the straw quality through chopping for cattle feed, as well as entrepreneurship skills. Farmers were taught to make the concentrate feed using locally available materials.

Four days after the training, Mr. Kumar started making his own concentrate feed. In three months, he turned out to be an enthusiastic entrepreneur, making feed for his cattle and selling the extra to villagers who either lacked the time or the finances to purchase what they did not have on their farm. Most farmers in six neighboring villages have adopted the concentrate feeding practice and have also now learnt the importance of quality control in concentrate feed production.

The demand for high-quality feed in Guagadia is growing. Farmers have even expressed their willingness to pay more for high quality feed (which results in more milk production), as opposed to a cheaper, lower quality feed. While Mr. Kumar initially produced feed only for his cows, he is now supplying eight other farmers who had attended the training with him, as well as farmers in six neighboring villages.

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1 This story is the part of CSISA project funded by bill & Melinda gates foundation and USAID.
surrounding villages. Farmers like the consistency of the feed supplied plus they get to chop their straw at Mr. Kumar’s farm when they come to deliver the milk.

From his earnings Mr. Kumar has already bought sacks, a weighing machine and a sealing machine for the feed in a bid to ensure he sells the right quantities and the best quality. He took out a loan with a local financial institution, which he used to acquire a tractor to carry the rice straw from the fields and the ingredients bought from the local market for preparing the concentrated feed for his dairy animals. Mr. Kumar hopes to continue his association with ILRI so that his business can continue to grow, and he can continue to meet the feed concentrate needs of his and his village's dairy animals.

*International Livestock Research Institute (ILRI), New Delhi*
Livestock Feeding Made Easy for Women Farmers in Odisha

Pravati Prabha Behera is a member and secretary of the Kapila Muni Milk Society under Orissa State Cooperative Milk Producers’ Federation (OMFED) in Barandua village, Bhadrak district. She owns 7 cows that produce 15 liters of milk per day. Three of these are crossbred, which produce more milk than a local breed. She is responsible for the maintenance of the straw chopping machine, the only one in their village. The machine is kept at the village trading square, where women members of the Kapila Milk Society come to get their straw chopped. Feeding livestock is often a challenge in Barandua. The plots of land are small and mostly devoted to growth of paddy during the rainy season and to some extent vegetables during winter. The cattle are fed at home until harvest is over, when they are allowed to feed on the remaining straw in the rice fields. They are also fed on the broken rice and bran from the market and they do home-based feeding. Historically, farmers have used a home-based hand cutter for chopping the straw, which is tedious and time consuming.

Through CSISA, the International Livestock Research Institute (ILRI) has introduced crop residue-based animal feeding strategies and provided the chopping machine in Behera’s village, and farmers like her are now seeing the benefits. Women farmers find the machine useful as it can chop straw in
less time than the hand cutter can. Farmers are also chopping and soaking the straw that helps to increase its digestibility and intake. So they are using less straw and less concentrate than previously and are getting more milk yield. They feed the chopped straw to the animal in a bowl, which reduces chances of contamination, as a result cattle health is improving. The saved rice straw can be fed to cattle over 4-5 months, helping reduce expenses. "The animals are also adapting to the new taste of soaked fodder," Behera observes. "Once they have tasted the green fodder and the chopped and soaked straw, they no longer want to eat the dry straw."

Women in Barandua have learnt to organize their week around the machine - often cutting the straw two to three times in a week and storing it in gunny bags. The milk society pays for the maintenance costs of the machine and sometimes Behera collects some money from the society members. Neighboring villagers have also started adopting the technology after seeing the benefits. As a mother, Behera considers the food security of her family, and others’, very important. She teaches other mothers in her village to give their children milk before the remainder is sold. "Milk helps us guard against the effects of crop failure and it improves our nutrition. Every day, we have milk to drink even when it is too little to sell."
Economic benefit derived by the farmer by growing green fodder in his land.

Anadi Samal, Jajpur

Sri Anadi Samal, S/O- Krushna Samal, At-Goudasahi, Po-Masahara, Block-Binjharpur, Jajpur, Pin-755012

"Green fodder production has helped for maintenance of productive and reproductive health of my Dairy animals". Anadi -A Dairy farmer of Goudasahi told emotionally when he was asked about the benefits of green fodder cultivated by him in his land.

Sri Samal has developed 1.50 Ac. of land under fodder cultivation including perennial and seasonal fodder. He owns about 10 cross bred dairy animal which are primarily maintained by feeding green fodder. The average production of milk is around 100 liters a day. He says that, feeding of cows exclusively with concentrated feed will be expensive and cost of production per liter of milk will be high. However, production of green fodder of different variety in my own land has reduced the cost of production. The animals are in good health and there is no reproductive complications noticed till now.

Azolla cultivation is also another source of green production by Sri Samal. He has developed an Azolla in his back yard. Everyday around 2 to 3 Kg of Azolla is being produced which supports Sri Samal for feeding quality nutritious green to his animals and birds. He expresses that, Azolla cultivation has also supported him by reducing quantity of concerted feed.

In addition to dairy farming and green fodder production It has been also observed that Sri Samal has a broiler farm with capacity of 2,000 birds, vermin compost unit and has also adopted "Magur" cultivation with his own.

Sri Samal a progressive farmer cum-entrepreneur of the district certainly has derived economic benefits by growing green fodder in his land.
Options For Sustainable Fodder Production In Farmers Field Condition

Dr. Asim kumar Biswal,
Fodder Officer,(OLRDS),
F& ARD dept., Govt. of Odisha

Sustainable Green fodder production at farmers level in Odisha, is to be seen in the context of various types of situations that prevails in their real life of farming community of Odisha such as: their priority for type of farming, size of land holding, their agro-climatic situation, capability to adopt the technology, time taken for cash back from their effort, type of livestock they keep and their traditional way of rearing livestock, entrepreneurship attitude and so on. Majority of the farming system, is grain crop focused (paddy based), where as livestock rearing by them for remunerative income is obscure. When we consider the size of the land holding (average 2.5ha), its very difficult for them to decide to adopt fodder cultivation practice in place of their traditional crop in their already limited land holding. Most often, farmers are recommended for the improved species of fodder crop, modern agronomic practices, mechanization, clean cultivation practice etc. overlooking to the real fact of requirement such as "what is his/her farm’s requirement, what he/she can adopt and what he/she can not, whether the effort towards growing fodder in his limited land holding will get him/her immediate cash back, whether fodder cultivation can eliminate the feeding problem of livestock for round the year, what value addition can be achieved to his/her effort etc. Several such questions puzzle him or her before adopting fodder as a sole crop for his/her farm and finally they end up with a decision to continue with the same traditional feeding system of "low input -low output". Therefore it is realized that, sustainable fodder production at farmers level is a socio-technical issue and just not a technical issue of improved variety or agronomic practice. Thus, in this paper an attempt has been made to find out ways and means to address the issues for sustainable fodder production at farmers level through on farm research by involving farmers in decision making and ranking of proven technology through different participatory trial conducted in their own land.
The objective of such participatory trial was to facilitate the end user,
• To adopt the technology that are simple and replicable while it is validated scientifically to meet the nutritional need of livestock.
• To come up with farmers friendly sustainable fodder production technology

This participatory research conducted in the farmers field has a series of trials that were conducted considering to the real life situation of farming community of the state.

Different options that gives a scope to the end user to adopt fodder technology are as follows:

Option -1 Production Of Fodder without disturbing the normal Cropping Schedule of farmers

In this option farmers are given chance to include seasonal fodder crops in their grain cropping schedule such a pre paddy kharif fodder crop and a post paddy harvest fodder crop that suits to their agro-climatic situation.. Further Inter planting of legume seeds / perennial fodder with horticultural species

Option -2- Amelioration Of Natural Resources Like Field Bunds, Gochar Land and Unutilized Land for fodder through community participation:

Under this option farmers can be educated to give rest ( restrict grazing for some time) to the natural bund vegetation for their potential as natural fodder resource of their area.

Although the newly introduced fodder species may take long time to grow , establish and naturalized, the community can be motivated to over sow the seeds of proven variety on community waste lands and common grazing land

Further Trees on field bunds provides an excellent scope for availing fodder round the year.

Fodder tree legumes are highly nutritious , easy to grow and relatively easy to manage. Because of their nitrogen fixing ability they improve soil fertility and do not compete with any food crops and they can be intercropped. Fodder trees can be fed to dairy cows and goats.

Fodder trees can be easily established and maintained as hedge rows. Once established can be harvested round the year for about 20 years providing green legume fodder even during the dry season.

In a state like Odisha, livestock are fed regularly with low quality crop residues such as paddy straw. Green fodder are available to livestock only during some particular season. With supplementation to the basic ration of farmers with high quality fodder tree legume leaves excellent results have been obtained for enhancing the animal productivity.

Option -3- Supplementation To Farmers Basic Ration Of Crop Residues

Under this option quality aspects of different feed stuff available in villages can be first analyzed and corrective supplementation by using enrichment technology, Azolla and fodder tree leaves can be taken up. Farmers can store the leaf meal like they traditionally store the Kunda( paddy husk and bran) for long time. Feeding of fodder trees leaves as Supplementation to the basic ration of farmers has an excellent impact on the
relative productivity of their livestock.

**Option -4. Convergence with other line departments**

Under this option different line department such as Agriculture, Forest department, watershed mission, and Fisheries dept to work together to enhance the fodder availability in the state.

**Agriculture department may:**
- Make provision in their cropping strategy (both kharif strategy and rabi strategy) to include fodder as a crop. The Chief District veterinary Officer of the district can be invited regularly in the district cropping strategy meeting.
- Both the Directorate can work in a coordinated manner in fodder development.

**Forest department:**
- A coordinated effort can be taken up with Forest department for mutual benefit such as:
  - Silvi-Pasture development
  - Collection of natural grasses from the forest floor and bailing them for lean season.
  - Agro-forestry / farm forestry can be jointly taken up for enhancing the fodder availability.

**Watershed Mission.**
- A coordinated effort can be taken up with watershed mission to plant fodder crops and trees near the percolation tank, Gully plugging for bund stabilization and fodder.

**Fisheries department**
- A coordinated effort can be taken up with Fisheries department for establishment of bund vegetation around the water body.
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ଜୁଳ୍ଳାକାର ପିରିକୁଡ଼ର ଉଗୁଣୀ ଅକ୍ତଳ

ଚାଁଧାର ୧୪ଭୁ, ଢଳା

ଗୃହ ଜଳରକ, ତାରିକାର ଗାଢ଼, ତାରିକ ମାନକାର, ତରାରାପରାପାର, ତରାର ତରିକାର, ତରାର ତରିକାର। (ଦର୍ପ) ୮ ୫ ଫେବେରୁଣ ନାଗରୀକ ଜଳରେ ଧାରଣା କରାର ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇଁ ପାଇ�ื่�ଃ
ପୁଣ୍ଯ ଦଳ ସାରି: ଅଭନ୍ନେ ଗାଡୀ

ଘାଟିଜା କାର୍ତୀକାର୍ତ&nbsp;ଦିଗାଳରେ ଦଳଧ୍ୱନୀ ରାଜ୍ୟର ପ୍ରାଚୀନ ଓ କାଳର ମଧ୍ୟରେ ଅଭନ୍ନେ ଗାଡୀ ଓପରେ ଇରିତ୍ୟ କରିଛନ୍ତି। ପ୍ରେକ୍ଷିତା ନାଗରିକରେ ପ୍ରବାହରାଶୀ ରହିଛନ୍ତି। 

ଅଭନ୍ନେ ଗାଡୀ ଓପରେ ଇରିତ୍ୟ କରିଛନ୍ତି ହେବ ଓପରେ ଆଧୁନିକ କୌତଫେକୁ ଓ କର୍ତ୍ତରାଣ ମଧ୍ୟସୁଧାରାଣ ସମୟରେ ଭାରତୀୟ ଇରିତ୍ୟ ନିର୍ଭର ଏହି ଗାଡୀରେ ଇରିତ୍ୟ କରିଛନ୍ତି। 

ଅଭନ୍ନେ ଗାଡୀ ଓପରେ ଇରିତ୍ୟ କରିଛନ୍ତି ହେବ ଓପରେ ଆଧୁନିକ କୌତଫେକୁ ଓ କର୍ତ୍ତରାଣ ସମୟରେ ଭାରତୀୟ ଇରିତ୍ୟ ନିର୍ଭର ଏହି ଗାଡୀରେ ଇରିତ୍ୟ କରିଛନ୍ତି।

ଅଭନ୍ନେ ଗାଡୀ ଓପରେ ଇରିତ୍ୟ କରିଛନ୍ତି ହେବ ଓପରେ ଆଧୁନିକ କୌତଫେକୁ ଓ କର୍ତ୍ତରାଣ ସମୟରେ ଭାରତୀୟ ଇରିତ୍ୟ ନିର୍ଭର ଏହି ଗାଡୀରେ ଇରିତ୍ୟ କରିଛନ୍ତି।

ଅଭନ୍ନେ ଗାଡୀ ଓପରେ ଇରିତ୍ୟ କରିଛନ୍ତି ହେବ ଓପରେ ଆଧୁନିକ କୌତ୍ଫେକୁ ଓ କର୍ତ୍ତରାଣ ସମୟରେ ଭାରତୀୟ ଇରିତ୍ୟ ନିର୍ଭର ଏହି ଗାଡୀରେ ଇରିତ୍ୟ କରିଛନ୍ତି।
ବାଧାରେକାଳରେ ଜେର ରାଜାକୁ ପୂର୍ବରେ ବାଧା ନମାଯିତ କିପରେ ରାଜାରେକାଳରେ ଜେର ରାଜାକୁ ପୂର୍ବରେ ବାଧା ନମାଯିତ କିପରେ ରାଜାକୁ ପୂର୍ବରେ ବାଧା ਮାଯିତ କିପରେ ରାଜାକୁ ପୂର୍ବରେ ବାଧା ਮାଯିତ କିପରେ ରାଜାକୁ ପୂର୍ବରେ ବାଧା ਮାଯିତ କି######

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ধনুজ চরিত্র চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

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পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র

পৃষ্ঠায় চরিত্র, চরিত্র, চরিত্র, চরিত্র
ପୂର୍ବାମାଝି ପଦାହର୍ମାତ୍ର: 
ଭିକ୍ଷ, ଖାନ୍ତ୍ୱରୁଣା ଓ ବରଣ୍ଯି
ପାଶ୍ଚତନ ଗାଢେଲେକ ଭାବନା ଦହାଇ

ପୁରୁଷୋତ୍ମର କାର୍ଯ୍ୟ, ଇରେବିଶ୍ୱ

ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟୟନ ପାଲନ କରାଯାଗିବା ମାତ୍ରା ପୁରୁଷୋତ୍ମର କାର୍ଯ୍ୟ କିଛଟ ବ୍ରମଣ ଦର୍ଶନ ପାଲନ କରାଯାଗିବା ହୁଇବାର ପ୍ରଭାବ ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟୟନ ପାଲନ କରାଯାଗିବାର ପ୍ରଭାବ ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟୟନ ପାଲନ କରାଯାଗିବାର ପ୍ରଭାବ ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟୟନ ପାଲନ କରାଯାଗିବା।

ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟୟନ ପାଲନ କରାଯାଗିବା ପ୍ରଭାବ ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟନ ପାଲନ କରାଯାଗିବା ପ୍ରଭାବ ପ୍ରାଚେତାଷ୍ଟ୍ରୀକ ବିଶ୍ୱିଦ୍ୟାକୁ ଦୁଇ ଖାଚୁ ଅଧ୍ୟନ ପାଲନ କରାଯାଗିବା.
ଶଦବରୋ ଭୁଗୋଦାର ଯାଦିପାନମାଣ

ଘାବାଗ ବିବାଦାର ପାଇଁ ବିଚାର, ବରୁଳାରେ, ପ୍ରକାଶନ୍ଦୁ ପ୍ରିତିକୁଳତା ବା ଲାଙ୍ଗାର ସମିକ୍ଷ.

1 ୫ ୧ ୩ ଗର୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍ତ୍�ତ

1976 ଜନ୍ମ ବାର୍ଷିକୀତା ଉପରେ କରିବାର ଲଭିତା। 2010 ବାର୍ଷିକୀତା ଉପରେ କରିବାର ଲଭିତା। 300 ବାର୍ଷିକୀତା ଉପରେ କରିବାର ଲଭିତ ହେଲା ରହେନ୍ତି। 400 ବାର୍ଷିକୀତା ଉପରେ କରିବାର ଲଭିତ ହେଲା ରହେନ୍ତି।
ନିତିକ ଓ ଦାରାଙ୍କର

ନିତିକ, ଦାରାଙ୍କର

ଦାରାଙ୍କର ପିଳ୍ଳୀ ଅପ୍ରମୂଳତାରେ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ ଦାରାଙ୍କର ପିଳ୍ଳୀ 

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ଉନିକୋର ପିଳ୍ଳୀ, ଉନିକୋର ପିଳ୍ଳୀ
"ମାଗେ ବୁଦ୍ଧ ଛାଡ଼" ହାରେକ ବୃତ୍ତକାର ଶରଙ୍ଗ ଓ ସରକାରକୁ ପ୍ରତି ପ୍ରତି ପାଇଁ ପରିୟକ୍ଷ ପ୍ରତିବଦ୍ଧ କରିଥାନ୍ତେ, ତିଆରି କାଲାକ୍ରମାଣ୍ଯ ଆଧାର ବନ୍ଧିତ କରିଥାନ୍ତେ, ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରି କରିଥାନ୍ତେ। ଏବଂ ବନ୍ଧୁଗ୍ରହ ଆଧାର ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ମୂଲ୍ଯରେତ୍ର, ପାରକାଳ୍ୟ ଏବଂକେ ଚାରୁ ବୃତ୍ତକାର ଏମାନ୍ତି ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ।

ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ବନ୍ଧୁଗ୍ରହ ପରିୟକ୍ଷ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ, ବନ୍ଧୁ ଗାଢ୍ୟାଣକ ତିଆରିକତା ବୃଦ୍ଧି କରିଥାନ୍ତେ।

"ବୁଦ୍ଧର ଦେଶର ଗ୍ରାମର ବୁଦ୍ଧ ହେବାର ପରୀକ୍ଷା ସେବା କରିବା ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ ନେଇ
ଭଳକ ପଦି। ବନ୍ତୀ ଦୁଇପାକ୍ଷର ବିଶ୍ୱିଲ୍ଲ ২.৫- ୫.০ ରିଶଚିତ ସୁପ୍ରିଷ୍ଠ ମାହମଣି। ମୁୟୁର ବିଶ୍ୱିୟର ବିଶ୍ୱିଲ୍ଲ କଙ୍କ୍ଷାକ୍ତର ০.০.১ ୨.৫- ୩.০ ମାତ୍ୟୁର ମାହମଣି। ବନ୍ତୀ ଦୁଇପାକ୍ଷର ବିଶ୍ୱିୟର ବିଶ୍ୱିଲ୍ଲ ମାହମଣି। ତାପୀୟର ଲକ୍ଷ୍ଯ ମାହମଣି। ବନ୍ତୀ ଦୁଇପାକ୍ଷର ବିଶ୍ୱିୟର ବିଶ୍ୱିଲ୍ଲ ମାହମଣି।

- ଭଳକ ପଦି। ମାଝର ବିଶ୍ୱିୟର ବିଶ୍ୱିଲ୍ଲ ମାହମଣି।

- ବନ୍ତୀ ଦୁଇପାକ୍ଷର ବିଶ୍ୱିୟର ବିଶ୍ୱିଲ୍ଲ ମାହମଣି।

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Present Fodder Scenario of
The State and Future Strategy

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State specific situation analysis
Odisha is tenth largest in the Indian Union, located in the eastern coastal peninsular India on the Bay of Bengal, between 17°48’ - 22°34’ latitude and 81°24’ - 87°29’ longitude. According to the altitude the state can be divided into three major zones such as low i.e. 26% medium i.e. 34% and high i.e. 40%. Agro-climatically the state can be divided into 10 Agro-climatic zones. The State witnesses 3 distinctive seasons such as Rainy season, winter season, & summer season. It receives an annual rainfall of 1497mm distributed over a period of 4 months from June to September. The winter season remain for a short period of nearly 2 months (December - January). The summer season is prominently spread over 4 months from March to June raising mercury column to 40-44°C. The average temperature during winter ranges from 8-10°C.

The existing trend in livestock feeding system in Orissa follow a "Low input Low output" practice. Almost all the livestock species in Orissa depend on seasonal occurrence of natural grass, crop residue, crop by products and grazing on the common property resource such as village goacher land, forest floor, village waste land and along the irrigation canal where ever available. Crop residues constitute the major source of fodder for livestock in the State. Only scanty no of educated farmers grow cultivated fodder species that are cut and carried to the shed but again not to the nutritional accomplishment of production requirement. Further Small ruminants survive entirely on grazing.

Thus enhancement of fodder production is quite inevitable for the state of Odisha for economic milk and meat production. Millions of tiny livestock enterprise scattered around the State, suffer from inadequacy in green fodder for which they are compelled to shut down their enterprise.

The main actors in the state for fodder promotion through funding under State Plan budget are, State Dept. of Animal Husbandry & Veterinary Services, OMFED, BAIF-Kalyani, JK Trust etc.
who are working in this intervention to promote the fodder in farmers field.

As fodder production by farmers, being the common agenda for all these stakeholder in Dairy intervention, a meaningful convergence of fodder activities has to happen with shared responsibilities. Further, adoption of standard package of practice & policy guideline shall eliminates any duplication or confusion at the level of end user i.e. farmers. Therefore it is of pivotal importance to train all actors/stakeholder of fodder development programme in the state by sharing information, adopting the common policy.

**Fodder Scenario of the State:**

The fodder development has been entrusted to the Fisheries Animal Resource Development Department as an end user. The Director Animal Husbandry and Veterinary Services Orissa, Cuttack executes the fodder development programme of the state. As per 2012 livestock census, the state of Orissa is a deficit state in fodder production. The present position of fodder requirement, availability and shortfall is given below.

**Fodder availability and shortfall:**

<table>
<thead>
<tr>
<th>Feed stuffs</th>
<th>Supply in '000 MT</th>
<th>Demand in '000 MT</th>
<th>Shortfall in '000 MT</th>
<th>Shortfall Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green fodder</td>
<td>24880.8411</td>
<td>32785</td>
<td>40691.32785</td>
<td>15810.48675</td>
</tr>
<tr>
<td>Dry fodder</td>
<td>15262.26</td>
<td>15759.56912</td>
<td>497.3041205</td>
<td>4%</td>
</tr>
</tbody>
</table>

So to overcome this shortfall, the major challenges are:

- Introducing the forage based production system in the state for all categories of livestock species.
- Introducing Fodder production in the State as an Income generating activity (IGA) for enterprising farmers.
- Implementing the consumptive use of natural resources and maneuvering agricultural practices for livestock feeding.

**Programmes:**

i) Fodder seed production Programme.

ii) Fodder Production & demonstration Programme.

iii) Minikits demonstration Programme.

iv) Fodder Seed procurement & distribution. (State Plan)

v) Utilization of crop residue. (State plan)

vi) Training and demonstration. (State plan)

vii) RKVY (Fodder Development Programme)

**I) Fodder seed production farms in the state:**

The Department of Animal Husbandry & Veterinary Services has eight numbers of fodder seed production farms which are located in different Agro-climatic zones of Orissa (as mentioned below). The seed production farms were established with an objective to ensure supply of quality fodder seeds to the farmers for enhancing the productivity of fodder crops. The fodder seeds produced are being utilized for demonstration programme and fodder production in the departmental dairy farms. Besides these, the pasture seeds produced in these farms are being sold to Soil Conservation Department, Forest Department and public for undertaking pasture development programme in the State.

**II) Fodder Demonstration Farms:**

The state has 13 fodder farms where fodder & planting materials like rootslips of different fodder crops are produced.
The fodder and root/ slips produced in these farms are distributed or sold to dairy farmers and other agencies of the State.

III) Minikit Programme:
Under this programme the Government of India supply different fodder seed minikits to the state for distribution to the farmers on free of cost. The state bears the cost of transportation for the respective programme. During this year 6100 Nos. of minikits has been supplied to the farmers of the State.

IV) Fodder Seed Procurement & Distribution Programme:
This is a State plan scheme Government has provided Rs. 70.34 Lakhs during the year 2014-15. The fund has been provided Director Agriculture and food production, Odisha for procurement of fodder seed. During the year 2014-15, 1114 nos. of Minikits has been supplied to the farmers of the state. The detail is given below.

V) Enrichment of crop Residue (State plan):
This programme is being taken up by Government of Odisha to ensure the feeding quality roughages i.e. to maintain the animal health, productivity by feeding nutritional rich roughages of animals in the State.

Under this scheme the farmers those who have paddy straw/any other crop residue/ sugarcane top along with the cattle are involved in this programme. The local Gomitra, LI, VAS selects the farmers who have livestock especially large ruminant/CB animals and those who have paddy straw / other crop residue. The selected farmers are being trained and demonstrated the practice of enrichment crop residue. In this programme a farmer is being provided with Urea, molasses, and Ground Maize etc. In the Year 2014-15 for progression of this Enrichment Crop Residue Programme the State Government provided Rs. 30.00 Lakhs. Under this programme 1500 Intensive Gram Panchayats have been included to take up 6000 Nos of units of crop residue programme.

VI) Training and Demonstration in Fodder Cultivation and Pasture Development and strengthening of Departmental Fodder Farms (State Plan):
The Prime objectives of this project is as follows
1. To demonstrate fodder production technology for productivity in different agro-climatic conditions of the state.
2. To introduce fodder as a crop within the existing grain cropping system.
3. To enhance the capacity of farmers for adoption of fodder production technology through on-site demonstration.

The fodder staffs of the district select different demonstration sites in various clusters involving the local VASs, AVASs, LIs, Gomitras, Secretaries of MPCS, SHGs & lead farmers having CB animals. The interested District Milk Union & private dairies can also be associated to train the farmers.

During the year 2014-15, Govt. of Odisha has provided Rs. 403.00 Lakhs towards strengthening the farms/ training of farmers/logistic to minikits. Out of which two Fodder seed farm & one Fodder farm have been developed.
80

And 55.5 qtls. Of fodder seed have been produced so far.

VII) RKVY programme (Rashtriya Krishi Vikash Yojana)
The prime objective of this programme is
1. To create fodder demonstration plot and lead trainer at village level for dissemination of fodder production and its utilization technology.
2. To enhance the capacity of farmers for adoption of fodder production technology through field level training.
3. To support expansion of fodder area and to support fodder and planting material availability in the area.

Under this programme following activities are being taken up:-
1. Seasonal Fodder Cultivation
2. Perennial Fodder Cultivation
3. Distribution of Chaff Cutter
4. Distribution of Feeding Trough
5. Azolla Cultivation
6. Enrichment of Crop Residue
7. Training & Demonstration

Besides all these approaches the State is still shortage in green fodder production resulting into low productivity from the animal husbandry sector. Hence the vision of the department will be to achieve

Green forage based livestock production system to be adopted by the farmers for maintaining Large and small animals, by deriving at least 50% of their feeding requirement from greens and 20% from quality crop residue. The rest 30% sourced from grain by-products concentrate feed & to exploit the optimum production potentiality of the large animals and small animal

Suggested Fodder Policy:
80% of the green requirement of the CB animal in the intensive zone to be produced through perennial fodder crops and the rest 20% through seasonal fodder crops. In the potential zone 20% of green will be produced from perennial fodder crops and 80% from seasonal.

This strategy has been taken considering to the irrigation potential available in the intensive zone and the current fallow land available in the potential zone.

The pasture development programme will be taken up through group involvement on the common property resources such as gochar land, waste land and the outer slopes of the canal bunds of the irrigation canals.

The nutritional supplementation to livestock feeding are to be taken up by adoption of Azolla & Enrichment of low grade roughages in large scale.

So far Perennial fodder cultivation is limited to cereal crops only for which perennial legume in form of fodder tree crops are to be take up as a regular crop.

The Animal Husbandry Department is having a limited technical man power for the fodder sector. This limited technical man power can be utilized by updating their knowledge on technology application through training and orienting their working towards expanding the knowledge base in an extension network.

The individual farmers and groups such as MPCS, Pani Panchayats, Breeder’s Forum, SHGs taking up dairy and small animal production are to be provided with training for transfer of technology by creating trainers from amongst them, the lead farmers and group functionaries.
Other line department taking up fodder related activities under water resource department, Watershed Mission and areas specific programmes under ITDA, Forestry sector to be sensitized and trained for technology adoption related to fodder and pasture development in a network mode.

The crop residue available in surplus such as paddy straw, Maize Stover, Ground Nut, black gram, green gram, horse gram, etc. are to be processed as dry fodder blocks for supply to the deficit area. These fodder blocks are to be manufactured by automated machine in a PPP mode with the assistance of NABARD & the CSP scheme of GOI, and at the farmers level by using simple and replicable tools.

For technology identification and its application in the field, it is necessary to have micro level feeding management study involving the research group of the forage station of OUAT and the Animal Nutrition Department of the OVC with the OMFED and lead farmer group. The fodder wing may lead in constituting a State level working committee for the purpose. Govt. may also consider for the proposed "Odisha Fodder Development Society" to carry forward the new technology transfer in a network mode involving different agencies and departments.

Strategy:
1. Introduction of Farming system based and situation specific species in to the area
2. Demonstration of only those fodder technology that works for that specific area.
3. The fodder development programme will be incentivised in the milk shed area for increasing the area of green fodder cultivation.
4. Equal emphasis for feeding of small animals of the state.
5. Input assistance for fodder tree nursery raising that leads to fodder tree seeds and fodder tree saplings production in the state.
6. Substantiation and optimum utilization of locally available agriculture by products at the farmers level for livestock consumption
7. Support for feed block and UMB making at the farmers own home and marketing support.
8. Fodder demonstrations and training will be imparted to the farmers and groups for adoption of technology on fodder production and its utilization.
9. Quality planting materials and seeds will be produced by the Departmental Farms, other agencies and Seed Growers.
10. Insurance support to farmers for fodder seed production (certified and TL seeds)
11. Ensure involvement of MPCS, Gram Panchayat, Panipanchayat & interest groups in community based Fodder cultivation programme and adoption of new technology.