September 2017 volume 19 no.3

LEISA INDIA

Magazine on Low External Input Sustainable Agriculture

agri cultures INDIAN EDITION

Ecological livestock

LEISA INDIA

September 2017 Volume 19 no. 3

LEISA India is published quarterly by AME Foundation

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PRINTING

Nagaraj & Co. Pvt. Ltd., Chennai

COVER PHOTO

Cattle forms a prominent part of the farm for this farmer in Dharwad, Karnataka. (Photo: AMEF)

The AgriCultures Network

LEISA India is a member of the global Agricultures Network. Seven organisations that provide information on small-scale, sustainable agriculture worldwide, and that publish:

Farming Matters *(in English)*

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LEISA India *(in English, Kannada, Tamil, Hindi, Telugu, Oriya, Marathi and Punjabi)*

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Dear Readers

Livestock is the most critical and underestimated component of sustainable rural livelihoods. It provides multiple benefits. It enhances the household nutritional access – in the form of milk, meat, eggs etc. It provides resilience by serving as ready 'ATM's in critical times. Livestock provides the critical link in eco friendly farming systems – in manure production, in crop protection. eg. use of cow dung for manurial purposes and urine for preparation of biologicals. The value of local breeds, in terms of their resilience, low cost of maintenance, is simply ignored. Also, the industrial mode of livestock management with high volumes and hidden subsidies, the large scale ecological damage they cause, is not discussed enough.

This issue puts together some of the ground experiences which are sustainable. These experiences reflect the rich biodiversity… the opportunity they offer to lessen environmental damage, for sustainable futures. It is extremely difficult and challenging to put together working alternatives. For this, we are extremely grateful to those who contribute articles, creating new hope and visibility to unsung initiatives.

Meanwhile, we humbly continue to seek your support through voluntary contributions. You may also use this platform for wider sharing of eco-friendly services, products and events.

The Editors

LEISA is about Low-External-Input and Sustainable Agriculture. It is about the technical and social options open to farmers who seek to improve productivity and income in an ecologically sound way. LEISA is about the optimal use of local resources and natural processes and, if necessary, the safe and efficient use of external inputs. It is about the empowerment of male and female farmers and the communities who seek to build their future on the bases of their own knowledge, skills, values, culture and institutions. LEISA is also about participatory methodologies to strengthen the capacity of farmers and other actors, to improve agriculture and adapt it to changing needs and conditions. LEISA seeks to combine indigenous and scientific knowledge and to influence policy formulation to create a conducive environment for its further development. LEISA is a concept, an approach and a political message.

AMEF is a member of AgriCultures Network, which is involved in co-creation and sharing of knowledge on family farming and agro ecology. The network is **locally rooted and globally connected**. Besides magazines, the network is involved in multi stake holders' engagement and policy advocacy for promotion of small holder family farming and agroecology. The network consists of members from Brazil, Ethiopia, India, Netherlands, Peru and Senegal. The secretariat of the network is located in IED Afrique, Dakar, Senegal.

MISEREOR founded in 1958 is the German Catholic Bishops' Organisation for Development Cooperation. For over 50 years MISEREOR has been committed to fighting poverty in Africa, Asia and Latin America. MISEREOR's support is available to any human being in need – regardless of their religion, ethnicity or gender. MISEREOR believes in supporting initiatives driven and owned by the poor and the disadvantaged. It prefers to work in partnership with its local partners. Together with the beneficiaries, the partners involved help shape local development processes and implement the projects. This is how MISEREOR, together with its partners, responds to constantly changing challenges. (www.misereor.de; www.misereor.org)

AME Foundation promotes sustainable livelihoods through combining indigenous knowledge and innovative technologies for Low-External-Input natural resource management. Towards this objective, AME Foundation works with small and marginal farmers in the Deccan Plateau region by generating farming alternatives, enriching the knowledge base, training, linking development agencies and sharing experience.

AMEF is working closely with interested groups of farmers in clusters of villages, to enable them to generate and adopt alternative farming practices. These locations with enhanced visibility are utilised as learning situations for practitioners and promoters of eco-farming systems, which includes NGOs and NGO networks. **www.amefound.org**

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A platform to be heard and seen

Monika Agarwal and Jessica Duncan

In India, pastoralists have long struggled to make their voices heard. Cultural and religious differences have exacerbated this situation. But a new initiative is allowing them to assert their identity, identify as a collective, and generate political momentum. The Pastoral Parliament represents a key space for pastoralists to meet, discuss and take decisions about the issues affecting them, without political, religious or caste-based segregation.

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Ecological livestock

Livestock forms an important livelihood support system for about seventy million rural households in India, especially in the arid and semi-arid regions of the country. They are infact integral to rural life, supporting agriculture, contributing to the household nutrition, supplementing incomes and offering employment opportunities. They are the best insurance against the vagaries of nature due to drought, famine and other natural calamities. Majority of the population dependant on livestock for livelihoods are the landless, small and marginal farmers. Traditionally, local communities, livestock and local cultures have been strongly linked.

With changing diets and lifestyles, the demand for livestock products is growing faster than demand for other foods. The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) projected livestock production to increase by 117% from 2000 to 2050, along with a doubling in grazing intensity in pasturelands and massive growth in cattle numbers (from 1.5 billion animals in 2000 to 2.6 billion in 2050 (IAASTD 2009).

This increased demand for protein foods in turn triggers the need to increase livestock production at a faster pace. To meet the demand, livestock is being produced in a factory mode, forgetting the fact that they are living beings. This industrial mode of production has further weaned them away from being part of the farming system. Both agriculture and livestock operate as separate entities leading to unsustainable production systems. Production intensification is contributing to a host of problems like disease spread leading to epidemic levels, shortage of fodder and feed, global warming etc. Research done by GRAIN shows that it is the *industrial* meat and dairy complex that causes this tremendous damage to the planet, not traditional livestock reared by smallholders. Deforestation, industrial feed crops, use of chemical fertilizers, transport and refrigeration, and massive waste are all central elements of the industrial meat and dairy complex, responsible for huge amounts of climate gases. The FAO calculated that, today, meat production alone – especially that of the industrial type – generates more greenhouse gas emissions than all the world's transport combined.

How then do we strike a balance between meeting increasing demand while limiting the negative effects of commercial production? How do we use the limited resources available? How do we use modern technology and increase production efficiency without damaging our planet's resources? How do we make the ecosystems sustainable while using their services for crop and livestock production? Ecological livestock system seems to be a solution.

Moving towards an ecological livestock system

Ecological livestock systems integrate cropping and livestock production. Such integration allows for better management of nutrient flows and recycling of limited resources. Here, manure is not a waste but serves as a valuable input that needs to be returned to soils. Crop wastes serve as fodder. Biological diversity is enhanced for greater resilience. Local breeds that are hardy and survive in difficult conditions are reared rather than going in for exotic breeds which need expensive external resources. Focus will be on improving overall animal health. Such integrated systems which will be knowledge intensive, as well, will value the local traditional knowledge. Farmer participation and innovation will be key to such systems.

Ecological systems are not technology intensive. It encompasses fine tuning the current practices with sensitivity towards the local ecology, culture and community needs. There are many positive examples of communities moving towards ecological livestock systems, which go unnoticed amidst commercial production systems. A few of those inspiring initiatives are presented in this issue.

Local livestock breeds are being lost at an alarming rate, and this a matter of serious concern. While not enough efforts are being made by the government to conserve these traditional breeds, there are many champions in local communities, who are conserving local breeds and making a living out of it. SEVA, an NGO in Tamil Nadu has been identifying, documenting and recognising the efforts of such champions. Breeds like *Umblachery* cattle, *malabari* goats, *Belahi* cattle, *Chevvadu* sheep etc., are being protected by these local communities. Its time for the government and

policy makers to recognize such initiatives and support them. (P Vivekanandan, p.9)

Women play a major role in livestock production. They take care of the animals, their feed and health. Community initiatives have shown that improvement in access to technologies for higher productivity, financial and health services, active participation in different stages of value chains, collective action to achieve the economy of scale in production and marketing through organizing in to groups etc., have brought positive changes in gender roles and relations at individual, household and society levels.(Manjula M et al., p.15). In another instance, a community led livestock extension service delivery was tried and the capacities of women rearers were strengthened. With access to knowledge and inputs, the goat rearers of Gondia district were able to make a decent livelihood with goat rearing. Being a women centric initiative, it also brought out a positive change in the lives of women and in the communities. (Sanjeev Kumar, p.6).

There are a number of innovative farmers like Baskaran (Suresh Kanna, p.27) who are practicing crop-livestock integrated systems, following an ecological approach. Baskaran rears a local breed, *Umblachery* and feeds it with grasses and crop residues. Research results from Kolar and Chikkaballapur districts of Karnataka has also shown that higher roughage feeding results in higher milk production while high proportion of concentrates leads to subclinical ketosis **(**S Rajeshwaran, p.20**).** Feeding cattle therefore need to be based on the understanding of rumen physiology and nutrient requirements, but not on standards and prescriptions. This is not only cost effective but also sustainable.

We see that even the traditional pastoralist communities are adapting themselves to changes that are happening around them. Traditionally the pastoral communities in the higher altitudinal zones of the Himalaya, such as the *Bhotiya*, *Bakarwal*, *Van Gujjar*, *Gaddi*, *Lepcha*, and *Monpas* have been practicing livestock herding by migrating from one ecological zone to another on seasonal basis. But with declining pastures and grazing lands, they are adapting to changing situations by altering their livestock numbers and livestock management practices.(Maikhuri R K. et al., p22, Amandeep Singh and Pranav Kumar, p.25)

Concerns and need for supportive policies

In countries like India, livestock management invariably refers to the role of women, small farmers, landless and the poor and the pastoralists. Unless the concerns of these groups are taken into account and efforts made to support them, people-centered growth in the livestock sector will be a distant dream. Livestock policies in India, over the years, have moved from their focus on "enhancing productivity and efficiency" to "inclusiveness and equity". However, a lot needs to be done to convert these intentions into ground reality. (Manjula M et al., p.15). CSO initiatives like "The Pastoral Parliament" has shown that when the collective spirit of the pastoralists is mobilized, they are empowered to assert their identity, identify as a collective, and generate political momentum (Monika Agarwal and Jessica Duncan, p.34). Learnings from such positive and empowering initiatives need to be integrated while formulating policies.

The industrial production of livestock, to meet the growing demands of meat all over the globe, is contributing to the climate crisis. Reports state that if heavy eaters of industrial meat reduced their unhealthy levels of consumption to the World Health Organization's recommended amounts, the world could eliminate 40% of all current greenhouse gas emissions (GRAIN, p.12). As a society, we need to move towards a low meat and dairy diets. This will have a tremendous positive impact on the climate, and most importantly on the human health. This shift can occur if we take meaningful steps towards agroecology and food sovereignty.

◆

Key facts

- Around 1.3 billion people depend on livestock for their livelihoods, among which are 600 million poor farmers.
- Global demand for livestock products will increase by 70% to feed a population estimated to reach 9.6 billion by 2050.
- Total emissions from global livestock: 7.1 Gigatonnes of CO_2-equiv per year, representing 14.5 percent of all anthropogenic GHG emissions.

(source: FAO)

Pashu Sakhi

An alternative livestock extension approach

Sanjeev Kumar

With access to knowledge and inputs, the goat rearers of Gondia district in Maharashtra are able to make a decent livelihood with goat rearing. A community based alternative extension system which is women centric, has also brought out a positive change in the lives of women and in the communities.

Small livestock, like goat, sheep, pig and poultry is a critical source of livelihoods for rural poor, especially for women, in developing and underdeveloped countries, including India. Small livestock are perceived to have several benefits. According to field studies, small livestock serve as a source of income, as assets which could be encashed in times of emergency, as source of nutrition (milk and meat), as a source of medicine (milk), and as gifts during ceremonies.

A batch of local community women trained as Pashu Sakhi

Photo: Author

One of the many problems that the livestock farmers have been facing is high mortality and morbidity of animals. High mortality and morbidity of goats leads to economic, social and mental stress, making rural households highly vulnerable. Women are the worst sufferers of such tragedies owing to their high involvement with small livestock. Also, they take care of ailing animals, which consumes significant time and energy. Families try to cope with such loss of livestock by selling food grains. In extreme cases, it may lead to even stopping child education and opting for long distance migration. Several other challenges for livestock farmers are genetic degradation of goats, feed scarcity, seasonal stress, absence of transparent system of price estimation of goats, inefficient trading, high costs of aggregation and low adoption of information technology. Besides, lack of access to timely, low cost, door step livestock health care, first aid and knowledge support has been a key constraint in livestock production.

Responding to such a situation, an alternative community led livestock extension service mechanism has been tried and promoted. Through this community based approach, women are empowered through technical training and hand holding support to take lead in generating demand for inputs and provide services to livestock farmers. By building their capacities and providing hand holding support, over 4712 *Pashu Sakhis* (meaning friends of livestock) have been promoted in 16 Indian states reaching to over 2.5 lakh small livestock farmers daily. The present case is about a partnership initiative between Maharashtra State Rural Livelihood Mission (MSRLM), Mahila Arthik Vikas Mahamandal (MAVIM) and The Goat Trust, which promoted the alternative community based extension approach in *Gondia*, a tribal dominated district in Maharshtra.

Uniqueness of approach

Alternative livestock extension services had been a felt need over last five decades. Many experiments around promoting and nurturing such service delivery mechanism had been tried at various points of time, with limited success. Major shortcomings of existing programs were – the trained rural youth responsible to cater to 8-15 villages often focused on treatment, mostly on large livestock, rather than preventive practices and awareness building. Conflicting interests resulted in the neglect of small livestock and the poor farmers. Secondly, high costs of travel resulted in the neglect of close monitoring and administering first aid, which was in itself not lucrative for the youth. The trained youth who were men most of the time, had a social and psychological barrier in reaching women, who are the caretakers of livestock.

The goat population increased by over 25% in one year, with the mortality rates dropping from 22% to 6%.

Table 1: Activity data sheet - Gondia district

Description	Salekasa	Tiroda	Total
No. of villages	74	70	144
Number of Pashusakhis	65	70	135
Number of goat reares	5317	8542	13859
Number of goats	26039	28230	54269
No. of goat clubs	168	118	286
First Aid treatments	20944	3922	24866
Herbal treatments	13779	2256	16035
No. of Castreted Goats	2103	205	2308
Increase in goat numbers	5453	6923	12376
Reduction In mortality rates	6.50%	8%	0.145

Based on learning from past limited success and some failure, an alternative process was conceptualized and implemented on scale to assess feasibility and impact of *Pashu Sakhi* model. In this initiative, semi literate women are trained as *Pashu Sakhi*. Prior to training, the women are selected by the community, their roles and responsibilities are briefed by involving the family heads. The process is followed to enhance community ownership and family support for effective functioning of *Pashu Sakhi*. Once nominated by local goat farmers, a systematic orientation is organized, followed by 5 day residential training. A participatory training process adjusted with the pace of learner, was evolved to have multiple training methodologies around key knowledge, skills and attitudes required to function as *Pashu Sakhi*.

Besides treatment, *Pashu Sakhi* training module focuses on management practices and sharing of best practices. *Pashu Sakhis* essentially are small livestock farmers and adopters of best practices, rather than just propagators. This enhances knowledge and creditability of Pashu Sakhi as a best practice propagator and local leadership.

Role of Pashu Sakhi

Pashu Sakhi performs three kind of complimentary functions:

- Extension of improved practices and knowledge sharing
- Providing door step first aid and counseling services for disease prevention and management

- Demonstration of best practices and enterprise management in her own house.

Pashu Sakhis also work as monitoring and support service provider for the project. They visit each goat house and assess the condition. A regular monitoring on disease spread and decrease in frequency of morbidity (disease) is kept through data analysis. They provide critical feedback on adoption and suggest appropriate practice, technology or input based on the relevance and feasibility.

Pashu Sakhis through awareness and training motivate farmers to adopt good practices which boosts demand for new inputs. To meet the demand locally, Pashu Sakhis are trained to take up entrepreneurial activities too. In fact, *Pashu Sakhis* sustain on entrepreneurial initiatives of input supply for goat farming rather than by providing services alone (eg., providing treatment and first aid).

Photo: Author

Pashu Sakhi gets hands-on training on treating goats

In a nut shell, *Pashu Sakhi* works more like an Anganwadi worker and ANM in human health management. The only difference is that here she becomes an input supplier, a self business promoter, and also a service provider, making the system sustainable and more effective over a period of time.

Major changes

In about twelve to eighteen months of the programme, positive impacts were observed on two fronts. There has been significant decrease in mortality of goats. Goat mortality dropped from 22% to 6%, which saved nearly 8600 goats every year, thus generating over 51 million rupees. Besides reduced morbidity, reduced kidding interval and better growth of kids have collectively contributed Rs 25 million gain in goat farming. This has been reflected in over 25% growth of goat population in last one year. Further, farmers increased confidence resulted in further investment in goat farming.

Field assessment study in Gondia has provided strong evidences on improved knowledge, services, technology propagation and adoption by goat farming families. There has been enhanced faith of the community in managing risks. This in turn has enabled goat farmers to negotiate enhanced price for their goats and bucks.

Pashu Sakhis earned Rs 800 to Rs 2000 as an additional income by improving their goat rearing practices and by providing services to others. By way of contributing to the family finances, these women gained recognition in the household as well as in the community. They were being recognized in the society as providers of critical services. Attitude of men towards women, especially from the higher castes, has shown dramatic change for good. *Pashu Sakhis* are now being addressed with greater respect and affection, sometimes being referred to as *"doctor didi"* by villagers.

Way forward

The alternative community based extension model in Gondia district was successful and sustainable. Factors like high density of small livestock and lack of access to knowledge and basic services have played a crucial role in the success of this model. The Goat Trust is now exploring market opportunities, facilitating market linkages and building the capacities of *Pashu Sakhis* in estimating and assessing live body weight pricing of small livestock. The model of *Pashu Sakhi* is being extended to other livestock too. It has been tried for poultry, successfully. It is yet to be tested for large ruminants, on a scale.

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Local practices conserve livestock breeds

P Vivekanandan

There is an alarming loss of local breeds of livestock for various reasons. Yet, there are many champions in local communities depending on livestock, who are conserving local breeds and making a living out of it. Its time for the government and policy makers to recognize such initiatives and support the conservation initiatives for sustainable livestock development.

India is home to a large number of local livestock breeds that have been nurtured by pastoralist communities - Bakkarwal of Kashmir, the Van Gujjar of Uttarkhand, the Gaddi of Himachal Pradesh, the Raika, Gujjar, Sindhi Muslim and Rajput in Rajasthan, the Maldhari of Gujarat, the Gowli and Dhangar of Maharashtra and Karnataka, the Toda, Kurumbar, Konar and Bargur Lingayat in Tamil Nadu are some among them. There are about 151 registered breeds in our country. There are many more that still need to be described.

Ramasamy family has been conserving Umblachery cattle breed for the last 75 years

Photo: Author

With the disappearance of India's common lands, pasture lands, tanks and forests, the local livestock breeds are being lost at an alarming rate. Many factors have contributed to the loss of livestock in general and local breeds in particular. With the advent of technological revolution, animal drought power has been replaced with tractors and power operated equipments, making livestock redundant. On the other hand, with agriculture becoming less remunerative, the village youth are going in search of other livelihood options, leaving agriculture and animal rearing. Even the government has contributed to the rural crisis. For example, the rural employment programmes, have added to the labour shortage, which is already prevalent in the villages, thus affecting small farmers and livestock keepers.

Despite such situations, there are a number of good initiatives being attempted by few local communities and grass-roots institutions that have sustained livestock development and conservation of local breeds. SEVA is one such grassroot organization which has been actively involved in conserving traditional breeds of livestock. Individuals who are conserving local breeds are identified, their efforts documented and are recognized by awarding "Breed Saviour Awards". This initiative of recognising the local breed savior started in 2009 with the support of National Biodiversity Authority in association with National Bureau of Animal Genetic Resources and Honey bee Network.

Over the last 7 years more than 150 cases have been documented. The case of Mr. Ramasamy who received breed savior award during 2017 for conserving Umbalacherry, a local cattle breed is presented here.

Local cattle-many benefits

Mr. G. Ramasamy, aged 74, belongs to a traditional livestock keeping family. His family has been solely dependent on cattle rearing. He has been involved in livestock keeping from his childhood, assisting his father.

Ramasamy's family has been involved in conservation of *Umbalachery* cattle breed for the last 75 years. His grandfather, Mr. Subbiah Pillai bought *Attukkarimadu*, a subtype of *Umbalachery* cattle, for Rs.80/- from a pastoral woman. The salient features of Umbalachery breed is the presence of white colored stripe on the forehead while the body colour is dark grey. It has white mark on the feet and tail too. There are 4 distinct types based on morphological features within the breed viz. Attukari, Suryakulathu maadu, Ganapthiyan maadu, vennamadu. The purity of subtypes is maintained by maintaining the purity of bulls.

Productivity of *Umbalachery* cow is 9-12 lactations and the cow would be allowed for mating after 4th month of calving.

Factors determining sustainability of breed population

- Selective breeding and management increases productivity of animals.
- Potential to earn income through sale of livestock products (milk, manure, meat) and young ones.
- Low cost of animal keeping under extensive production system with zero input costs
- Integrating livestock in mixed farming system which in turn reduces cost of external inputs and income security for farmers

Milking is stopped when the colour of milk turns yellow. Calves are allowed to suck maximum milk. Male calves become bull in the 3rd year (with formation of 4 teeth) and they are maintained for breeding, for 10-12 years. Earlier, the bulls were in high demand when they were trained as plough bullocks for wetland ploughing.

Presently, the family maintains 51 cattle (34 cows, 14 calves, 3 bulls). Maintaining cattle has served many purposes for the family. Milk yield which is around 1.5 litres-4 litres per day is used for own consumption and is not sold. They get financial returns mainly by selling calves. They sell 5-6 pairs of calves per year for Rs.12000-15000/- per calf. The cattle manure is used in their agricultural land. Around 30 cart loads of manure is applied per acre which is 3 times more than the normal application. Due to this he has reduced chemical fertilizer to half the quantity. Use of organic manure has increased the yields. His average yield of paddy is

Man Singh with his 70 Belahi cattle in north Himalayan hills of Himachal Pradesh

Photo: Author

45 bags per acre while it is 30 bags/ac for others. Beyond these benefits, the cattle serve a social and cultural cause too. The family has custom of sending lactating cows to their daughter's house (after marriage) to meet the milk needs of young children.

Few more champions

1. Livestock keepers of *Belahi* cattle belong to a specific Gujjar community. They are landless and depend only on cattle rearing. Belahi is a migratory breed of cattle maintained purely on grazing in the foot hills of the Himalayas. It is maintained on low input and medium output system of management. Generally they have 4-5 lactating cows in a herd of single family. One person is engaged full time as a labour to rear these cattle. The average daily milk yield is 4-5 litres. The fat percentage is around 5.5%, which is quite high as compared to the milk obtained from crossbred cattle which is around 4%. Milk is sold at Rs 30/lt. The bulls and bullocks of *Belahi* cattle are priced for ploughing and other agricultural operation in foothills. A pair of *Belahi* male of around one year is sold at Rs 25000-30000/- at cattle fair of Sundernagar in Himachal Pradesh. As they are landless they sell cattle manure and get around Rs.3000-5000/-. The earnings depend on the number of animals housed in open fields for 2-3 months. The maintenance cost of these cattle is low as they are allowed to graze. There are no supplements provided nor is there any cost of veterinary medicine. Hardly Rs 10/- is spent per animal in an year. But there is always a loss of 1-2 animals per year during migration and due to death of cows, for reasons unknown.
2. Mrs Roja an agricultural labour in Thalassery village in Kerala, maintains 50 *Malabari* goats. She earns an income of Rs. 15,000 per month through sale of milk, manure and young ones.
3. Mr V. John maintains 170 sheep of *Chevvadu* sheep (red colored), in Alavanthankulam village, Tirunelveli district of Tamil Nadu. The ram of this breed is used for religious purpose and for this reason Chevvadu sheep fetch more income to farmers by selling of rams.
4. Mr Paulraj has been maintaining a herd of 60 *Vembur* sheep breed which is fast growing in semi arid black cotton soil area in Thoothukudi district of Tamil Nadu.
5. *Toda* buffaloes in Nilgiris survive at 1500 meter altitude providing livelihood security to Toda tribes in Nilgiris, Tamil Nadu. Mr Ranjit, a tribal famer in Gaddimund, in Nilgiris has been maintaining these buffaloes, making money through sale of milk.

Photo: Author

Roja makes a living by maintaining 50 Malabari goats

These cases are 'positive deviants' and can serve as guiding spirits for replication in other parts of the country. These good experiences need to be shared with others working for conservation of the local breeds. This indeed is a beginning and it is expected to facilitate the government, scientists and policy makers to formulate plans and policies by involving local communities / livestock keepers by recognizing their practices for their role as guardians of domestic animal diversity.

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About climate, meat and markets

High time to move towards agroecology and food sovereignty

GRAIN

As temperatures rise across the globe, meat and dairy have been found to be a major culprit. Still, the industrial meat industry actively facilitates the growth in consumption rates. We can only solve the climate crisis if we take meaningful steps towards agroecology and food sovereignty.

Our global food system is one of the biggest drivers of climate change. It accounts for over one third of all global greenhouse gas emissions, according to latest estimates from the Meridian Institute. Livestock represent the biggest portion of this. Research done by GRAIN shows that it is the *industrial* meat and dairy complex that produces this tremendous damage, not traditional livestock reared by smallholders. Deforestation, industrial feed crops, use of chemical fertilizers, manure

Biodiverse small scale livestock production leads to environment and human health benefits

Photo: Diana Quiroz

Meat-free Thursdays

The city of Ghent, Belgium, became the first city in the world to officially stimulate its citizens to have a weekly vegetarian day. The structural government support and involvement in this initiative sets it apart from other campaigns promoting reduced meat consumption. In partnership with the NGO, EVA (Ethical Vegetarian Alternative), the city of Ghent launched 'Thursday Veggie Day' in 2009. Response among local citizens and local public institutions has generally been very positive. People's awareness of the issues concerning meat (and especially the global warming impact) is rising. Two years after its launch, 60,000 people indicated that they participate several times a month and, 94% of public school students were choosing the vegetarian meal on Thursdays. Beyond the city, from Cape Town to São Paulo, cities are launching similar campaigns that were inspired by Ghent.

Source: Leenaert, T (2016). Meat moderation: a challenge for government and civil society. In: Sustainable Food Planning: evolving theory and practice (Viljoen, A and Wiskerke, J. S. C Eds.).

lagoons, transport and refrigeration, and massive waste are all central elements of the industrial meat and dairy complex responsible for huge amounts of climate gases. The FAO calculated that, today, meat production alone – especially that of the industrial type – generates more greenhouse gas emissions than all the world's transport combined.

Yet, meat consumption is soaring in many places of the world. If current trends continue global meat consumption will grow a further 76% from current levels by 2050, according to the latest studies, pushing us deeper into the climate crisis. If, on the other hand, heavy eaters of industrial meat reduced their unhealthy levels of consumption to the World Health Organization's recommended amounts, the world could eliminate 40% of all current greenhouse gas emissions.

So, why is meat consumption increasing so much beyond sustainable and healthy levels? The most common narrative is that the growing middle class in many newly industrialising countries can now afford to eat more meat, and thus jump on the opportunity. Indeed, the projected growth of meat consumption is especially stark in countries like China, Brazil, India and other countries in their regions. But that is only part of the story.

The other side of the story is that the industrial meat industry actually facilitates the growth in consumption rates. It produces cheap meat surpluses which are traded as global commodities and pushed onto markets everywhere. As a consequence, industrial meat is the most rapidly growing segment of meat and dairy production, accounting for 80% of the global growth in recent years.

Meat production alone generates more greenhouse gas emissions than all the world's transport combined

Propping up the corporate meat market

So, why can industrial meat be produced so cheaply and expand so fast across the globe? Confinement of animals at a high stocking density is one part of a systematic effort to produce the highest output at the lowest cost. Yet, at least three key structural factors are at play here: corporations are fighting off any regulation of their sector, industrial meat is highly subsidised, and trade deals are signed to get it to expand massively into markets across the globe.

Attempts by governments to regulate meat consumption is met with resistance by the industry. When Germany drafted guidelines to reduce meat consumption, demonstrating that a 50% cut by 2030 would be "crucial to climate protection," the industry lobbied hard. By the November 2016 launch date, the country's climate change plan had been stripped of any reference at all to greenhouse gases in the agriculture sector. Similar stories can be told of the meat lobby in the United States (US), Brazil and other countries where industrial meat is strong.

Furthermore, the industry receives subsidies in many countries. For example, in 2013, the European Union paid US$ 731 million to its cattle industry alone. The same year, the US Department of Agriculture paid more than US 300 million US dollars to just six huge meat companies in order to get industrial meat and dairy on school meal trays, compared to just a fraction of that to fruit and vegetable suppliers.

Shrinking the water and carbon footprint of school food

Oakland Unified School District (OUSD) in the state of California reduced animal protein on school menus by 30% while increasing fruit, vegetables, and legumes. When kids ate meat, it came from local organic producers. The result: a 14% reduction in the school's food carbon footprint. This translates into 600,000 kg of CO_2-equivalents saved per year – the same as driving 2.4 million kilometres less per year or covering all of OUSD's roofs with solar panels with *no* additional cost. They also reduced their water footprint by 6%, from 428 to 401 litres per meal served, saving a total of 159 million litres of water per school year and US$ 42,000 in the cost of the meals. Perhaps most remarkable: the children reported increased satisfaction with the healthy, regionally sourced meals.

Source: Hamerschlag, K. and Kraus-Polk, J. Shrinking the Carbon and Water Footprint of School Food. A recipe for combating climate change. 2017.

But, the big guns in the industry's arsenal are 'free trade' agreements. These corporate trade deals artificially prop up production and consumption by promoting the dumping of cheap meat and dairy into low income countries. They include clauses that eliminate protection for local farmers from foreign competitors, that make it illegal to grant preference to local suppliers or products, and that allow foreign companies to sue governments that adopt social or environmental legislation that they think could undermine their profits.

Without permissive regulations, subsidies and 'free trade' agreements, industrial meat would simply be too expensive to buy. These structural factors give priority to profits for an elite few and dismiss the massive environmental and social costs incurred by the corporations.

Support smallholders, agroecology and local markets

Corporate lobby groups, scientists and development agencies often paint small scale livestock holders in poor countries as the climate culprits because of their animals' low efficiency in converting calories to meat or milk on a per capita basis. Yet, a narrow focus on efficiency and emissions intensity ignores the multiple benefits of mixed, multi-functional and biodiverse small scale livestock production systems. These include providing local livelihoods, improving soil health, greater climatic resilience and other positive environmental and public health benefits. Small scale meat and dairy production is already well tailored to local food systems that support the moderate meat and dairy consumption levels needed to mitigate climate change *(see figure)*.

> Small scale meat and dairy production is well tailored to local food systems that support the moderate meat and dairy consumption levels needed to mitigate climate change

We can only solve the climate crisis if we take meaningful steps towards agroecology and food sovereignty. To achieve this, we need bold moves to disincentivise the production and consumption of cheap industrial meat and dairy. We also need to stop trade deals that prop up the massive international trade in meat and dairy products. Instead, small scale, local and agroecological meat and dairy production and marketing should be supported.

In this process, livestock will once again become integrated into diversified farming systems, while meat and dairy regain their proper place in peoples' diets. This is the approach that is needed to keep the world liveable for future generations. The task is daunting, but the stakes have never been higher.

Note: This article was originally published in June 2017 Issue of Farming Matters

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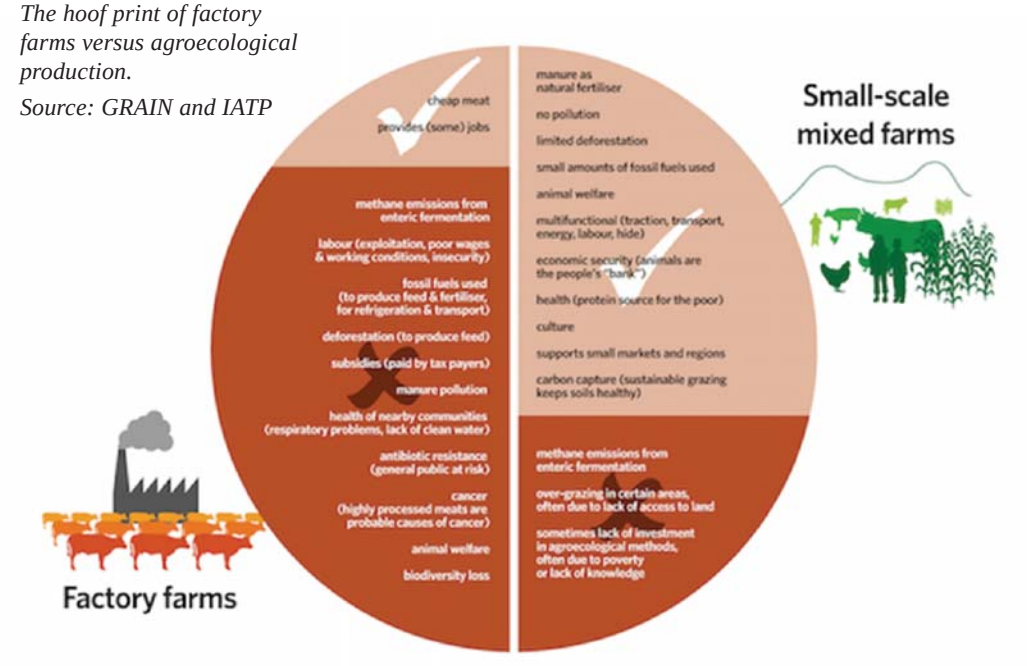
GRAIN is an international non-profit organisation that works to support small farmers and social movements in their struggles for community-controlled and biodiversity-based food systems. This article is based on a series of publications produced by GRAIN. Full references and sources for the figures quoted in this article can be found at *www.grain.org*



The hoof print of factory farms versus agroecological production.

Source: GRAIN and IATP

Gender and policies in livestock production

Issues and opportunities

M Manjula, R Rengalakshmi and **K Thachinamurthy**

Paradigm shifts in the approach from "enhancing productivity and efficiency" to "inclusiveness and equity" has led to change in the perspectives on livestock sector. This can serve as a means to reduce poverty and promote development, only when it is implemented effectively on the ground.

Livestock plays an important role in the national economy contributing to national income and generating foreign exchange earnings. With a total livestock population of 512 million, the sector accounts for 4.11% of the countries' GDP at current prices and 23% of gross valued added by Agriculture, Fishing and Forestry Sector at constant prices. Demand for high value livestock products like milk, meat and egg are projected to increase three-fold by 2020, providing immense opportunity for the growth and expansion of this sector.

Livestock is an important non-land productive asset for the women's livelihoods and support in household food security. More than 70% of the livestock in rural areas are owned by small holders and landless labourers. NSSO (2014) data shows that out of total rural workers in agriculture, 3.5% is engaged in livestock production. Among the agricultural allied activities, livestock production engages the largest share of female workers. 8.8% of the total female rural workers and 1.8% of total male rural workers are engaged in livestock production. Livestock production accounts for a larger share of self employed female workers compared to male workers. Proportion of rural women self employed in livestock production is 14.7%, compared to 2.9% of self employed male workers in the sector, indicating it to be a major household enterprise for the rural women next to crop cultivation. In the context of changing socio, economic and political situations, the rate of men migration to off-farm employment is increasing and ultimately women are managing the farms, including the livestock.

The role in management, labour, knowledge, ownership in livestock sector etc., differ between men and women farmers. Thus, men and women have differential knowledge, engage in specific roles, own different type of livestock and have different rights and control over the products. It is common that women own small livestock like goat, poultry and pigs and have the decision making capacity to sell and right to use the sale proceeds. Inspite of women's predominant role in management and production, their contribution is undervalued and not recognized in national policies and plans. Limited research and studies were carried out on women's role and participation in livestock farming when compared to their role in crop cultivation to recognize the issue and plan for targeted policies and programmes. The report of FAO argues that the agricultural productivity and output will increase to 10–30% and 4% respectively if women have the same level of access to resources as men. Deeper understanding on the context specific gender issues is necessary to provide inputs for research, development and policies.

The key gender issues in livestock sector that needs attention are access to and control over means of production such as livestock, productive resources like land and water, and services like credit, insurance, information, market etc. A striking reflection of the gender blindness of the policy framework is reflected in the membership pattern of diary cooperatives. Although women account for 90% of the labour force in livestock production, less than 25% of the memberships in diary cooperatives are that of women.

Inspite of women's predominant role in management and production, their contribution is undervalued and not recognized in national policies and plans.

Gender and livestock policies in India

The analysis of the livestock policies reveal that there is a disconnect between the policies and grassroot realities especially women and men's contribution in livestock production. The policy and programme scenario in the livestock sector in India before the 1990s has been driven by the "productivity enhancement" paradigm, while the post 1990 interventions adopted efficiency approach based on the structural adjustment programme of India. However both these approaches supported neither the small producers nor women. Considering the gap, Government of India, included 'inclusiveness' and 'equity' dimensions in the XI Five Year Plan - 2007-2012, titled as 'Inclusive Growth'. Also, the recent National Livestock Policy, 2013 states that it intends to enhance the productivity and production of livestock in a sustainable manner while ensuring farmers' livelihood. In one of its objectives, specific mention is made about the improvement in productivity especially among women and small farmers. The policy further touts, the promotion of Joint Liability Groups/Self Help groups to access institutional credit by the farmers and farmer producer organizations to facilitate the necessary backward and forward linkages. These paradigm shifts in the approach from "enhancing productivity and efficiency to inclusiveness and equity" led to change in the perspectives on livestock sector and it is seen as a means to reducing poverty and promoting development. However, the institutions and delivery mechanisms which are operating the policies into practice have not changed their perspectives to implement the inclusive growth concurrent to the changes in the livestock policies. Addressing the gaps in meso and micro level institutions to implement the inclusive policies are mandatory to bring the changes. Then, question arises that whether the inclusive approach alone helps to address prevailing gender issues in livestock sector. The latest initiative of the GOI in livestock sector is launching of National Livestock Mission (NLM) during 2014-15, as part of the 12th Five Year Plan. NLM is formulated by modifying and subsuming 7 Centrally Sponsored and 7 Central Sector Schemes. NLM has made an attempt to include a clause targeting the participation of women farmers in livestock sectors. The operational guidelines of the scheme spell out that 'state wherever possible should strive' to physically cover 30% women beneficiaries under each of the Mission schemes.

In this context, it is essential to integrate the learnings from the number of successful initiatives or models that have been demonstrated by many bi-lateral donor agencies, Civil Society Organizations (CSO's) and private agencies in integrating gender perspectives with specific focus to women and poor in livestock sector. More specifically, these initiatives have shown that improvement in access to technologies for higher productivity, financial and health services, active participation in different stages of value chains, collective action to achieve the economy of scale in production and marketing through organizing in to groups etc., have brought positive changes in gender roles and relations at individual, household and society levels. Hence, engendering livestock research for development would help to raise the gender issues and make effort to recognize the contribution of women and poor in livestock production. Such critical inputs are necessary from the research organizations to improve the policies for equitable development.

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Livestock rearing in the Indian context

Kamal Kishore

India has a rich heritage of rearing livestock and is home to number of indigenous breeds. The diversity of breeds itself is a risk mitigation characteristic. There is a temptation to move towards intensive production system based on exotic breeds which would increase the dependence on costly external inputs, thereby the costs as well as risks of maintenance.

The livestock-agriculture-commons complex is the bulwark of rural livelihoods; this complex provides poor and marginalized households – a modicum of stability, security and degree of control. Traditionally, family farming of cattle in India has depended on commons and crop residues to feed them, while leaving the arable land for agriculture. This demarcation makes even more sense today with increasing human population and increased demand for cereals, seeds, fruits, and vegetables. In fact, very little land can be spared by family farms for growing fodder for cattle with national average stagnating at 4 to 5% for the last 60 years.

Livestock rearing is a very important component of this trio, as it partially mitigates the stress emanating from the ongoing crisis in agriculture. The mainstream agriculture models, driven by external inputs, intensive production and markets are susceptible to the pulls and pressures of external environment. In the case of livestock rearing, it is still integrated with the natural environment to a greater extent, less dependent on purchased inputs and external factors. As a result, livestock rearing, even in the face of a crisis-ridden agriculture, contributes nearly 40% of the rural GDP across India. Another key factor is, in arid and semi-arid regions of India, agriculture is possible only for three to six months in the monsoon period and high cost irrigation investments are beyond the reach of most of the farmers. Thus, for a large percentage of the rural populace, cattle rearing, which provides steady income, is essential for their survival.

Livestock is maintained to handle, broadly, the following functions:

- *Output Functions*: source of edible / non-edible products.
- *Input Functions*: like providing draught power, dung, urine etc.in crop production
- *Economic Functions*: as a source of steady income
- *Risk Coverage Functions*: as easily encashable asset (crucial for resource poor) during crop failures
- *Socio-cultural Functions*: closely interwoven into socio-cultural aspects

India has a rich heritage of rearing livestock. It is home to number of breeds of cattle, small ruminants, fowl, pigs and equine species among others. The diversity of breeds itself is a certain risk mitigation characteristic; as animals are bred to fulfill a wide array of characteristics. Some of the selection criteria considered in the traditional breeding systems include the ability of the animals a) to withstand heat and humidity) to resist diseases c) to cope with feed stress d) to walk and graze forages e) to utilize a range of forages and f) survive for longer periods.

Across India, these breeds are icons of the inter-generational wisdom of the pastoral and livestock rearing communities. This special knowledge of pastoral and livestock rearing communities across the country on characteristics of different breeds has been phenomenal. For centuries, these

Indigenous breeds are icons of inter-generational wisdom of the pastoral and livestock rearing communities.

communities have been involved in studying and identifying breeds capable of withstanding harsh environment and suitable to their local agro-ecological conditions which enhanced the resilience of their food systems. Thus, they have been responsible for developing and conserving domestic animal diversity with important genetic traits. Ironically, in the last 70 years, almost nothing has been spent by the government on conserving desi cattle.

However, the impact of milk marketing network has to be recognized. It has played a significant role in the rural economy. While the contribution by the organized sector is about 30%, it has allowed and indirectly regulated the unorganized sector in creating individual/group marketing systems. Sale of milk does help family farms to get regular income, though not high profits. The average milk yield increase from Desi cattle has been 1.3 litres in 1990-1991 to 2.2 litres in 2011-2012 per day. This has been possible without incentivizing them. Even in drought, some of these animals survive – thus, can be managed with the limited feed and forage available. Invariably, the sale of animals provides distress income.

Traditionally, cattle rearing in India is not just confined to milk production alone. Cattle have always played a significant role in sustaining the agriculture production system by providing vital inputs like manure and draught power. The cattle depended on agriculture for feed through agricultural residues and fodder. The symbiotic relationship between these two production systems is the foundation of rural livelihoods. Also, that is the reason we have well defined draught breeds in the country.

Another key aspect of the traditional livestock rearing system is the institutional mechanisms that they sustain. Livestock keepers and pastoralists have nurtured a number of key institutions in rural societies for centuries. Institutions like *gual* (cowherd), *gochar* (the village grazing ground) and *godda* (the village bull), and the mechanisms for access, extraction, monitoring , sanctioning and the governance of these resource systems, are critical not just for the livestock production system but also for the entire rural livelihoods.

Cattle have always played a significant role in sustaining agriculture production system by providing vital inputs like manure and draught power.

However, as in the case of agriculture, livestock production system too is witnessing a rapid movement towards an intensive production model - characterized by a focus on one trait or breed; production of milk through heavy doses of external inputs like feed concentrates and other enhancing chemicals like antibiotics, probiotics etc. Statistical evidence shows that such a model is proving to be unsustainable even in Europe.The rising costs of production, owing to the dependence on external inputs, have pushed a number of livestock keepers out of the vocation; for example between 1984 and 2008, the number of livestock keepers in Denmark came down from about 33,800 to just about 3800. A major fallout of the rising cost of production in livestock keeping is the increasing indebtedness among livestock keepers. Over and above the whole system is protected enormously by subsidies. India is pushing itself into this trap with focus on intensive production system. Ushering in such a production system into India has the potential to pushing out traditional breeds and increasing the dependence on inputs like concentrates, medicines, genetic inputs like imported semen of exotic bulls, thereby increasing the costs of production. Critically, the production of these inputs is concentrated in the hands of a handful of few corporations across the globe. Heavy dependence on these companies would seriously compromise the sovereignty of not only the family farms but also the nation. Moreover, this system is highly unsuited to the agro-climatic and economic conditions of mostly tropical humid and sub-tropical India. In India, livestock rearing is mostly for sustenance and therefore productivity in absolute terms ignoring the context is questionable. Definitely it is not suitable for rain-fed and drought-prone, arid and highly humid areas.

It is necessary to look at the aspect of cross breeding too, a bit more closely. Crossbreeding by itself is neither good nor bad. It is only a mating system. Its utility is context specific considering the availability of resources, educational and social status of farmers and climatic conditions. The excessive focus on exotic breeds ignores evidence from the field which points to progressively stagnating milk production and returns from crossbreeds (10 litres per day in 1990-1991 to 6.8 litres 2010 to 2012). Evidence from various states indicates that the crossbreds progressively lose out on milk productivity and have fertility issue averaging about 2.5 lactations (compared to 6 to 8 lactations in the desi cattle). At the same time, it has been observed that these breeds are unable to cope with the harsh climatic conditions that characterize the arid and semi-arid parts of India where they require expensive cooling/ airconditioning equipment

for maintenance. They are less resistant to disease and heat or walk in order to forage. When it comes to productivity, it is true the productivity from crossbreeds in the short run is higher; but in the long run, when one considers the higher input costs, fewer lactations and the comparatively lower fertility of the crossbreds vis-a-vis indigenous varieties, one would conclude that even economically, indigenous breeds make sense in the long run. Introducing even high yielding breeds from other areas of India will be akin to using exotic breeds as they come from different agro-ecological regions and will create problems. We have noticed it in the case of Murrah buffaloes which have been indiscriminately promoted across the country with disastrous results. On an average the exotic/crossbred farms last from 3 to 6 years before they are closed.

Another important aspect is the feed and fodder which makes up for 60 to70% of the total cost of production in cattle rearing. The main feed requirements for cattle are dry fodder, concentrates and green fodder. While dry fodder is mostly derived from common lands, the balance is sourced either from agricultural lands or is purchased from markets. In arid and sub-humid regions, common pools meet about 70% of the fodder requirements, while in the semi-arid regions, crop residues meet more than 60% of the fodder requirements. It has been found that density of cattle has been found to be high in those areas where the net sown area and especially area under food crops is high. This indicates the high dependence on agricultural residues derived from food crops like millets, wheat, pulses, etc. On the contrary, in places where family farming has turned towards commercial crops, which is the case today in many dry land regions, sourcing fodder is becoming difficult. This is reflected in the fact that out of 55 micro-regions in the country, 43 micro-regions experience deficit in one form of feed material or other. Important reasons for the short-fall in fodder include diversion of lands for non-agricultural purposes, shift from food to cash crops and export of oil cakes.

Almost 70% of the milk, 98% of the small ruminant meat and sizable amount of large ruminant meat comes from animals solely dependent on the commons.This shows a clear direction in which developmental policies need to work.

In conclusion, the common lands need to be improved in their fodder production function. This is eminently possible. NGOs like Foundation for Ecological security, WOTR and many others have demonstrated that by improving common lands, the fodder production improves by up to 2 to 3 times. However, this is achieved only through community participation and promoting suitable practices. We cannot increase the cultivable fodder area. We need to recognize that largest number of livestock keepers are either landless or marginal farmers, Purchasing fodder would be beyond their capacity and availability.

Some of the useful measures, which could be promoted include,

- incorporating seeds which yield a good edible biomass in our agricultural practices;
- critically improving and increasing the edible biomass yield of our common property resources;
- making a right choice in introducing cattle/ buffalo breeds in different agro-climatic regions;
- in western India, high yielding milk breeds can be used in pure form or could be used for upgrading cattle in the local or adjoining areas;
- promoting milk recording at farmers gate;
- selection of bulls for higher milk yields needs to be simultaneously carried out;
- identifying possible breeds which may already exist in different areas;
- promoting milk yield competitions in different areas for identifying good milk yielding cows.

This will be a slow and time consuming process – but, ultimately will give us a strong indigenous base with all the good genetic characteristics. With regard to other approaches, we need to tread more carefully and with extreme patience.

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Present practice and advice on feeding cattle

Are they sustainable?

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Feeding cattle based on standards and prescriptions may not always lead to a better productivity of livestock. It may be cost intensive, harmful and unsustainable. Feeding cattle based on the understanding of rumen physiology and nutrient requirements is more cost effective and sustianable.

Veterinarians in India are inundated with emergency calls post festivals like Sankranti to treat cows and buffaloes suffering from acute ketosis due to feeding of rice and jaggary in large quantities. If not treated immediately it can even result in their death. This indicates that stomach of cows and buffaloes consisting of four compartments rumen, reticulum, omasum and abomasum are not equipped to handle foods like cereals and oilseed cake.

Cows and buffaloes are bovines. They along with ovines, sheep and goat have the ability to regurgitate their food and chew and hence called ruminants in general. Regurgitation takes place from the reticulum and this process is called rumination. The purpose of rumination is to masticate the food into finer particles, digest the cellulose in plants with enzymes from saliva and prepare it for ingestion by the bacteria in the rumen. It is this bacteria that form the food of the animal after digestion with an enzyme called lysozyme secreted by abomasum. Essentially, the stomach of a ruminant is a fermentation vat where bacteria grow. For this, a constant temperature and pH are of utmost importance.

Any activity that decreases ruminal motility, regurgitation process and results in a change in pH or temperature of the stomach content is detrimental to the health of the animal. A cow or buffalo produces about 100 to 150 litres of saliva, during the mastication process. It is this alkaline saliva that is critical for maintaining pH in the stomach and blood. Feeding of high proportion of concentrates to animal leads to subclinical ketosis and associated with loss in milk production. Research has also shown that higher roughage feeding results in higher milk production. Similar result has been seen in Kolar and Chikkaballapur districts of Karnataka in India also.

To highlight the difference of ruminants from other single stomached animals, we compare poultry which is reared for meat or egg purpose under intensive farming system. Birds are physiologically tuned to eat and digest seeds in their stomach called gizzard and not mouth as they lack teeth. Hence, feeding of seeds of cereal is a natural process and advising farmers to feed them with cereals and balanced concentrate feeds is in order.

It is against such documented research and practical observations that dairy farmers continue to feed wheat or rice husk, cereals, oilseed cakes, balanced concentrate feed and chaffed dry and green fodder of less than 1 inch to their cows and buffaloes! In fact, they are being advised to do to enhance milk production from their animals. It does increase milk production in the short-term. However, this increase is due to the fact that majority of cows and buffaloes in India suffer from negative energy and protein imbalance. Hence, any feeding that reduces the short-fall in any one of the two improves the general health and hence milk production. In fact, feeding of these materials with limited quantity of water and roughage does not even fill the stomach of the animals resulting in low or even dissatisfaction. Limited quantities

Feeding of high proportion of concentrates to animal leads to subclinical ketosis and associated with loss in milk production.

Feeding fodder giving sufficient time for rumination is a sustainable way to feed cattle

are fed because these feeds are costly and need to be bought on cash-basis from external sources.

It is probably based on these factors that dairy farmers in New Zealand and Australia do not feed their cows concentrate nor do they chaff the fodder, and rear their animals under extensive farming system. This gives their animals sufficient time to not only browse grass with clover, carbohydrate and protein source on their own but also rest and ruminate. In fact, these two countries are the cheapest producers of milk in the world followed by India, which is a strategic sectoral strength.

Further, feeding concentrates especially cereals to ruminants puts them in competition with humans. This competition and resultant higher demand leads to higher price. The poultry sector is already a big consumer of cereals, especially corn and in direct competition with humans causing a serious shortage in the domestic market.

Hence, feeding of cereals, oil-seed cakes and balanced concentrate feeds and finely chaffed green and dry fodder are cost ineffective and even harmful. Unrestrained feeding of green and enriched dry fodder with a mix of grass and legumes in the weight ratio of 3:1 with length of above 6 – 8", giving sufficient time for rumination at equal time intervals over the day is a cost-effective and sustainable way to feed and rear dairy animals.

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Livestock

The engine and inspiration of mountain economy

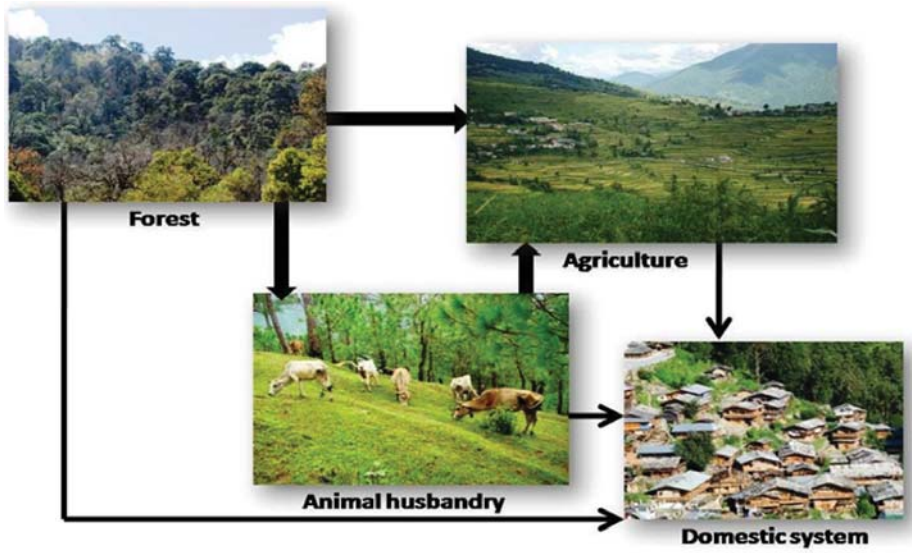
R K Maikhuri, L S Rawat, P C Phondani, Ajay Maletha and **Y M Bahuguna**

Traditionally pastoralist communities, with easy access to community resources, managed farming and livestock seamlessly. But with gradual loss of ownership on common resources, they are adapting to changing situations by altering their livestock numbers and management practices.

For the pastoralist communities of the Indian Himalayan region, livestock is the sole source of livelihood. Livestock is considered as 'the engine and inspiration' of the mountain economy as a source of food security in the form of milk and meat, providing supplementary income for rural household and reducing the vulnerability of livelihoods. Moreover, livestock manure is an important and valuable resource used to fertilize agriculture land. In the mixed crop–livestock farming systems of the Central Himalaya, livestock and food production systems are closely integrated.

Women collect and carry fodder from forest for the livestock

Figure 1: Inter-linkages and inter-dependencies between forest, agriculture and livestock systems in Central Himalayas.



Traditionally, mountain communities managed pastures and forests together. Majority of the households, with marginal landholdings, had easy access to the common resources to complement their private resources for sustaining their livestock. Nutrients from forests, grasslands and crop residues are fed to the animals and are recycled back to the cropland as manure. This complex inter-relationship between forests, grasslands, livestock and crops in mountain farming systems has contributed to the sustainability of mountain agriculture for generations (Fig. 1).

Livestock management

The pastoral communities in the higher altitudinal zones of the Himalaya, such as the *Bhotiya, Bakarwal, Van Gujjar, Gaddi, Lepcha*, and *Monpas* have

traditionally been practicing livestock herding by migrating to more suitable pastures from one ecological zone to another on seasonal basis. In Uttarakhand region, Bhotiya tribes (sheep and goat herders) as well as forest dwelling Van Gujjars (buffalo herders) migrate from foothill forests to alpine pastures. Livestock are allowed to graze on naturally available forage resources on the marginal lands, which are otherwise inaccessible for other land use.

The annual livestock management in the higher Himalaya villages is based on the traditional practices. Sheep and goats are left in open areas and forests under the supervision of shepherds (*anwals*) for grazing throughout the year. They are moved from alpine pastures to lower valleys during winter and back to the alpine pastures during summer. The shepherds feel that fodder availability, both in quantity and quality, is currently poor in the lower valleys, and thus mortality rates for animals increase during their stay in lower valleys in winters. The poor nutrition is said to be the reason for the poor quality and quantity of wool produced during shearing in March. The cattle and horses of settled villages are taken to common lands for grazing during the spring, summer, and rainy seasons and stall-fed in winter (December–February).

Gender and age both play critical roles in determining labour allocation patterns. Generally, women collect green grass/herbs, feed grazing animals, clean animal sheds, collect and carry fodder and litter to the house and are actively involved in composting of animal waste. Elderly women milk the animals and prepare butter and ghee. Elderly men make decisions regarding the breeding of animals and marketing animal products. Involvement of women is more than 60% for stall feeding, forage collection and more than 88% in litter collection, cleaning cattle sheds, making compost etc. However, in transhumant pastoralist communities about 90% work is contributed by men.

Managing the numbers of sheep and goats is essential for managing stock densities. Local people manage the animals by reducing their numbers, either by selling them to other consumers for meat production or by using them for local meat production. The number of animals reduced per year is about 35% of initial stock in the villages. However, the number of animals sold account for only 20%. Local inhabitants report that effective management of an average herd of about 400 animals, consisting of about 200 goats and 200 sheep and about 4–6 horses or mules, requires a 2-member shepherd team. If we exclude the uncertainties of livestock rearing, about Rs 1300 is the net benefit for each goat or sheep (Table 1). The sheep and goats show a high output–input ratio in monetary terms followed by pack animals (horses or mules), dairy cattle whereas bullocks had the lowest monetary output–input ratio.

Table 1: Annual cost of rearing a standard-size flock using the services of shepherds

Particulars	Cost (in Rupees)
Cereals (750 gm/day) in rearing 200 sheep/goats	9950.00
Salt, spices, oil, etc.	850.00
2 sheep as gift (Rs. 2800/sheep)	5600.00
2 pairs of shoes	900.00
2 blankets and 2 pairs of woolen dresses	4500.00
Smoke (Rs 190/shepherd/ month)	2280.00
Salt for sheep (2 kg per sheep or goat)	2400.00
Tax (Rs 5 per sheep/per goat)	1000.00
Total expenditure	**27480.00**
Sale of 55 sheep or goat (20%) @ Rs 4200.00/sheep	2,31,000.00
Wool (1.7 kg/sheep)	56,000.00
Gross income	2,87,000.00
Net income from 200 ruminants	**2,59,520.00**
Profit per sheep/goat	**1298.00**

Challenges and changing practices

Sustainability of the pastoralist community has consistently been threatened by the growing anthropogenic activities. Livestock grazing has been constrained in many forests. Pastoralists are facing uncertain future due to pressure from 'conservation' lobbies that want 'exclusive conservation'.

Reduction in grazing area, traditional rights on protected areas and reduction of forage have made it difficult to maintain the productivity of large numbers of animals. Sheep and goat populations have declined drastically during last two decades due to conservation policies and restrictions imposed on grazing rights by the Forest department. The average sheep and goat population declined by about 75.11% in the last 30 years (Table 2). The number of families rearing bullocks decreased in the villages of three valleys and this is because the people have abandoned their agriculture. In

Sheep and goat population have declined drastically during last two decades owing to conservation policies and restrictions imposed on grazing rights by the Forest department.

Table 2: Change in livestock population in some selected valleys of the Uttarakhand in three decades (1980-85 to 2010-15)

Livestock categories	Name of the valleys					
	Niti valley (10 villages)		Johar valley (13 villages)		Upper Mandakini valley (10 villages)	
	1980-85	2010-15	1980-85	2010-15	1980-85	2010-15
Cattle	1260	318	939	215	2860	1860
Buffalos	-	-	-	-	318	201
Horse/mules	430	160	590	188	436	415
Sheep/Goats	17090	5310	15390	2319	4655	1610

higher Himalayan villages, scarcity of fodder (especially in winter) is a major problem for raising livestock and the primary reason is the shrinking per capita landholding. Moreover, with modernization, socio-economic changes and fast expansion of education and the lure of government services, the present generation is now less willing to pursue such occupations.

Along with declining numbers of livestock, there have also been changes in livestock management practices. The most important is the increase in stall feeding in some areas, particularly for improved breeds of cattle. This has been brought about by both the shrinkage in grazing resources and incentives to rear high-yielding animals, e.g. improved buffaloes and cattle. These improved and cross-breed animals require better management and nutrition as well as stall feeding. There is also a lack of artificial insemination facilities in the villages to retain breed quality.

Conclusion

The lifestyles of traditional societies and particularly transhumant pastoralist populations in the Himalayan region are undergoing changes. For effective management of available resources in the region, continuance of transhumance by villages within the limits of carrying capacity is required. Revitalizing the production system and reducing grazing pressure would provide opportunities to continue the sustainable livelihood of transhumant pastoralists in the high altitude as well as in settled villages situated adjoining to protected areas.

In hill and mountain areas, where mixed crop–livestock production systems operate, livestock production makes a positive contribution towards sustainable agriculture, through its role in nutrient cycling and maintenance of soil fertility. Promoting suitable trees on open lands will help addressing the issue of fodder deficits. Also, strengthening research and extension linkages is necessary for promoting sustainable livestock management and development in the region. In view of women's significant role in livestock production, it is vital to address gender concerns in the sustainable management of livestock in mixed crop–livestock farming systems and in marketing. A sound policy, with an emphasis on ecological adaptability, is urgently needed.

Acknowledgments

Authors would like to thank the Director, G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), Kosi- Katarmal, Almora for providing facilities.

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Local communities, livestock and livelihoods

Amandeep Singh and **Pranav Kumar**

Bakarwals, the indigenous community in the Himalayas, have been depending on goats for their livelihoods. Their practices have not only sustained their livelihoods but have also sustained the ecology, in which they operate. With changing times, these local communities are adapting themselves to changing conditions and appropriate technologies.

Bakarwals are primarily pastoral nomads rearing goat and sheep in high-altitudes of Greater-Himalayas during summer and spend their winter in plains and foot hills of Shivaliks. They are special nomadic tribes mainly found in the Pirpanjal range of mountains located between the two states of Jammu and Kashmir and Himachal Pradesh. *Bakarwals* derive their livelihood from goat rearing and this practice is embedded deep into their folklores and culture. *Bakarwals* pass this culture of rearing small ruminants from one generation to other and keeping intact the prejudice of their name *Bakar-Wal*. They earn by selling live goats, chevon, fiber, skins, goat milk, by sale of *kaladis*, a special fermented milk product.

Bakarwals do not have a fixed place and they keep moving all around the year. They are high altitude rangers and range naturally growing meadows and pastures along with their livestock. *Bakarwals* plan their activities into four major segments of time: winter, spring, summer and autumn. They stay in the outer hills from December to mid-April. They migrate with their flocks (goat and sheep) towards alpine pastures of the Greater Himalayas from the last quarter of April till the first week of July. During this time, they cross different topographic zones successively on the route of migration and their activities are controlled both by the passing of time as well as crossing over the space zones in regulating their daily marches according to environmental conditions. They again start returning to the winter bases in the month of October with the same route of migration and reach the outer hills zone by November every year.

Bakarwals derive their livelihood from goat rearing

Goats and ecology

Goats are very helpful in maintaining the ecological balance. Goats control the spread of noxious weeds as they consume majority of them without any severe ill effect on their body. These animals graze and trample the vegetation which help in penetration of water into the soil and also check soil erosion. The browsing habit of goats further aid in the development of wildlife as the surface grown grass and small shrubs are consumed by them and are preserved for the wild herbivores in the forest areas. Moreover, the areas for a herd are earmarked and the land gets enriched with the manure by the same herd. The seeds of the herbage are transported through feces from one range to another along with manure, thus facilitating expansion of natural pastures.

Reduction in the pastures due to floods, excessive conversion of farming lands have led to shrinkage in effective herbage area for the livestock.

Bakarwals in changing conditions

Though most of the community is transhumant with seasonal movement, *Bakarwals* are now settling in permanent settlements in and around the suburbs and villages. They are also getting in touch with the State Departments and learning modern husbandry practices. The Sheep Husbandry departments of both Jammu & Kashmir divisions have started letting bucks to the *Bakarwals* for cross breeding their parent stock, thus increasing the production potential. They are also receiving better remuneration from sale of chevon, fiber and skins.

With increasing literacy, *Bakarwal* youth is opting for employment into the government and private sector, thus leaving behind the occupation of goat rearing. This is on one hand shrinking the goat population of the state and on the other hand, mitigating the ethos of *Bakarwal* tribe. To address this situation, the State Agriculture University has been organizing entrepreneurial development programmes for the *Bakarwal* youth to take goat farming on a large scale.

Reduction in the pastures due to floods, excessive conversion of farming land into construction land have led to shrinkage in effective herbage area for the livestock. This has forced the communities to either stall feed their livestock or to trek more rigorous heights for pastures. Also, the changing climate has led to the development of certain diseases. However, with the support of Sheep Husbandry Department, effective vaccination and deworming of goats have been taken up, thereby keeping many diseases under check.

Conclusion

Goats can play a pivotal role in the management of natural resources, while at the same time, continuing to produce high-quality food and fiber. When managed properly, small ruminants have been shown to be effective tools to control noxious weeds, enhance rangelands and reforestation projects, improve wildlife habitat and accomplish riparian and watershed management objectives. Additionally, they can do all of this in a manner that is not only sustainable, but also profitable.

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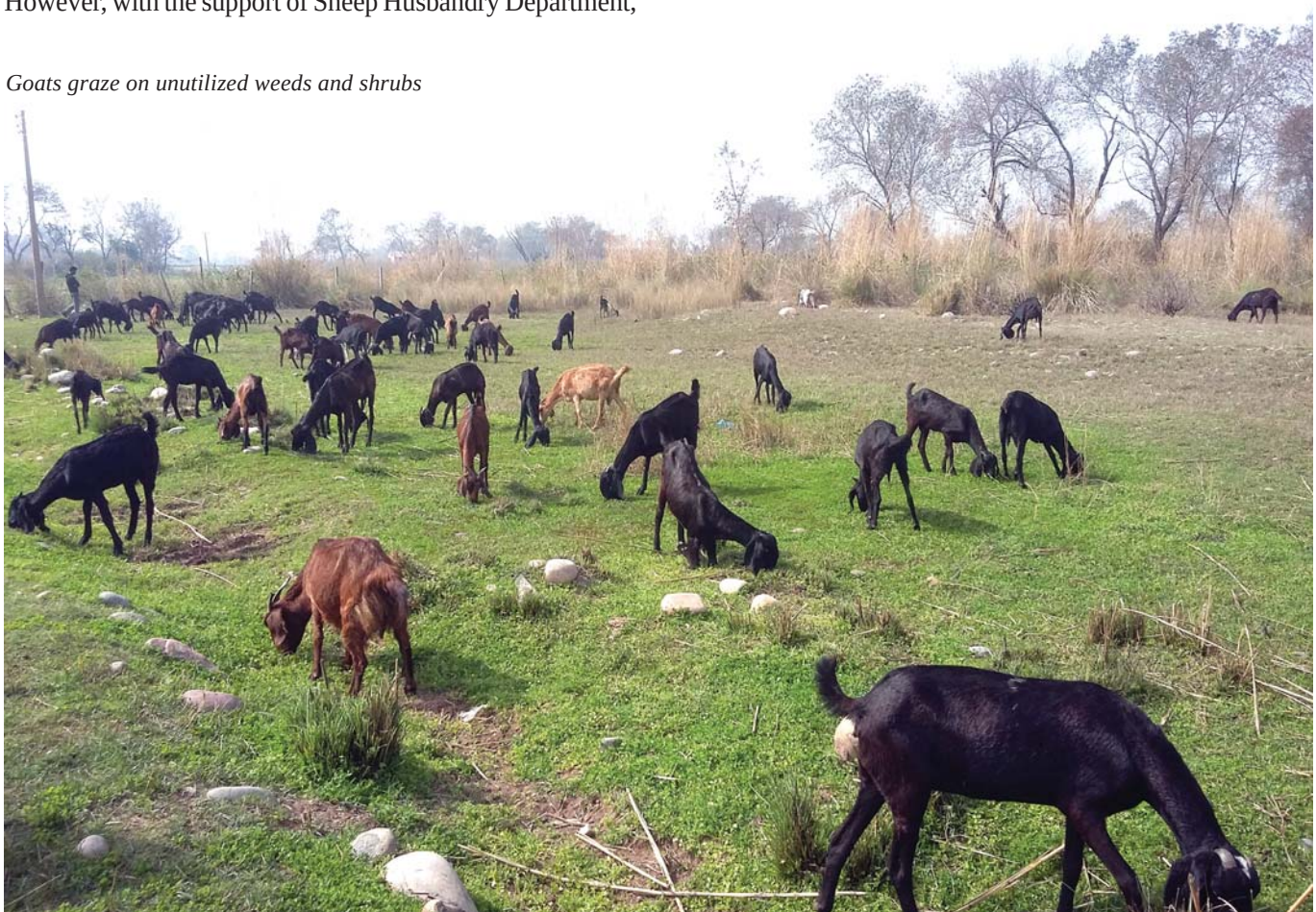
Goats graze on unutilized weeds and shrubs



Sustaining farm ecology and economy by integrating livestock

K Suresh Kanna

Making the most of the natural ecological processes, often results in sustainability. Simple practices like integrating livestock and farming, makes both activities beneficial. Benefits are in terms of increased production, reduced costs, enhanced family nutrition and better farm ecology.

Developmental experiences reveal that pathways of development in vulnerable situations are not linear, leading straight out of poverty, but are more like 'virtuous spirals'. Livestock provide people with incentives to develop these virtuous circles. The food they consume and the manure they produce make them the nutrient and economic catalysts of smallholder systems. For poor households, livestock serve as walking bank and savings accounts. Livestock production plays a crucial role in the management and utilisation of semi arid and arid lands. Under these conditions, animal husbandry is the traditional and major source of livelihood of people, with farming playing more of a complementary role.

Despite its multifarious utility, there is a lack of an explicitly spelled out priority for livestock. Even in development programmes, livestock activities are considered as income generating activities, restricting its perspective and focus. The following case elaborates the systematic planning and the need for integrated approach for maintaining livestock as a central component to enhance crop production and building agro ecology.

The initiative

Singonodai is a small village of Thirukkadaiyur block of Tharangampaadi taluk in Nagappattinam district. The village has around 60 farm families. The village was affected during the Tsunami in 2004. The agricultural lands were affected by the salt water intrusion and consequently, the soil salinity had increased. At this time, Kudumbam, an NGO working with resource poor farmers promoting sustainable agriculture alternatives, organized training programs and demonstration of organic agriculture approaches through farmer's field school. The process of participatory learning and sharing methods had motivated them to practise organic farming methods. A group of farmers came together to form an organic vegetable farmers group. In order to sustain the organic farming practices, farmers were supported with a loan assistance to buy livestock with the primary objective of preparing bio inputs using cow urine and cow dung and supplementary income through milk.

Manure from the cattle wastes is used for growing vegetables

Umblachery breed is more resistant to diseases when compared to cross bred animals

Ecological management of livestock

Baskaran is a young and enthusiastic farmer living in Singonodai. He owns 2 acres of land. He cultivates groundnut in 1.5 acres of land. The other 50 cents being sandy and suitable for vegetable cultivation, he grows vegetables, especially various kinds of gourds. He took the lead in the group to integrate livestock as core component for the production of organic vegetables. With the project support, he bought one cow of local breed Umblachery in 2009. He preferred buying a local breed as he knew that Umblachery cattle are more resistant to infectious diseases when compared to crossbred animals. Presently, he has two cows and a calf of the local breed.

Baskaran and family members consider the animals as part of their family. They take utmost care for its feed and health care. They are not allowed for free grazing. Baskaran and his mother collect around 20 kg of green grass, per animal, everyday. About 50% of the grass is collected from their

> Soil is considered sacred. Livestock is considered as a vital component to support farming.

Umblachery breed (Bos Indicus)

Umbalachery breed is an excellent draught breed of Tamil Nadu for its strength and sturdiness. This breed is the native of coastal districts *i.e.,* Thiruvarur and Nagappattinam of Tamil Nadu. This breed is the outcome of selection for short stature for work in marshy paddy fields. The name has been derived from its place of origin *i.e.,* Umblachery village in Nagappattiam district of Tamil Nadu.

The bullocks are capable of doing work for 6 hours to 7 hours under the hot sun. The cows are capable of producing one calf per year, upto 10 calves, in their life span. The fat percentage of the milk produced by this breed, ranges from 4.5% to 5.5 % and is more tastier. When compared to crossbred animals, Umblachery cattle are more resistant to infectious diseases. By instant skin twitching, it avoids flies and other insects sitting on its body. This is a typical character for this breed only.

The Government of Tamil Nadu has established a farm in 1954 at Orathanadu in Thanjavur district to develop this breed. Later a new farm is developed in Korkkai, near Umblachery village to conserve it on its home track. Through Tamil Nadu Livestock Development Agency, 40 heifers were distributed to Umblachery Cattle Herders Association members at free of cost during 2004 for preserving the germplasm of native breed.

own land and the remaining from the common pasture lands. Apart from green grasses, each animal is fed with 2 kg of wheat husk, 1 kg of groundnut cake mixed with Azolla and 1 kg of rice flour. In addition, they also feed with dry groundnut stalks after harvesting groundnut from his field. While he buys wheat husk and rice flour, others are recycled from his farm.

The cattle's health is managed using traditional wisdom. Baskaran finds this wisdom, passed on from his mother, very effective in maintaining the livestock health. As a precautionary measure to prevent foot and mouth disease, Baskaran applies neem oil on the legs of the cattle. Also fumigation using dry cow dung powder with neem leaves is followed.

Returns from crop-livestock integrated farm

The integration of livestock and crops brought several benefits for him. Around 15 cartloads of Farm Yard Manure is being produced onfarm by recycling the cowdung and wastes, which is being applied to his farm. The soil health has improved remarkably and the continuous application of bio manure has also increased the soil moisture holding capacities. *Wherever you go and take a handful of soil you will find plenty of earthworms which is mainly because of farm yard manure, which I got because of my livestock*, says Mr. Baskaran proudly. The improved production is very visible for everyone to see, in terms of the quality of vegetables, for eg., length of the snake gourd and its taste.

Application of FYM has greatly reduced the use of chemical fertilizers which has brought down his costs of production. He could save Rs. 5000 per acre as he uses Farm Yard Manure produced on his farm, as basal fertilizer. His costs further reduced by Rs. 3000 per acre, by using bio pest repellent mixtures.

The two cows yield about 8 litres of milk daily. This is almost double the normal milk yield of this breed. Out of the 8 litres, one litre is used for household consumption. The remaining 7 litres is sold to the nearest milk society for Rs. 28 per litre. Thus, he earns Rs.6000 per month from the two cows he owns.

Conclusion

Baskaran's farm is a successful example of a truly ecological farming where various components are integrated to make the most of the natural ecosystems and processes. Soil is considered sacred. Livestock is considered as a vital component to support farming. There is an element of nurturing, both soils and animals, rather than exploiting to reap benefits. The integration of livestock and farming has brought in numerous benefits. The family has access to safe and nutritious food, the entire family is engaged in farming, the farm ecology has improved and most importantly, the farm is economically viable too.

Baskaran is now a role model for integrated organic farming. Inspired by him, around 15 farmers in his village started practicing organic agriculture in small portion of their land.

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Cattle shed management for better soil health

Sujan Amgai and **Salik Ram Paudel**

Small interventions can have great impacts. A small support from the government for improving the cattle sheds resulted in a shift in the way farmers of Sindhuli district in Nepal practiced agriculture.

Agriculture in Nepal has long been based on subsistence farming, particularly in the hilly regions where peasants derive their living from fragmented plots of land cultivated under difficult conditions. To increase agricultural production, the government interventions have been in terms of increase in irrigation, higher use of fertilizers and insecticides, the introduction of new implements and new seeds of high-yield varieties, and the provision of credit. However, overuse of chemicals, absence of practices like crop rotation, lesser use of organic manure have all resulted in soil health deterioration, further affecting the food security.

With the aim of enhancing food security by promoting organic production and reducing the dependency on imported chemical fertilizers, Soil Management Directorate (SMD) in co-ordination with District Agriculture Development Offices (DADOs) has initiated various programs like Vermi-compost production, cattle shed improvement, organic fertilizer industries establishment and price subsidy to farmers purchasing organic fertilizers under Department of Agriculture (DoA).

Cattle shed improvement program

Traditionally, farmers managed large herds of cattle by allowing them to graze on pastures. With increasing trend of youth migrating for employment, there has been labour shortage to manage livestock. Consequently, rearing large herds and managing their wastes has become more challenging than before, in rural communities. There has been a gradual shift towards rearing livestock in cattle sheds.

Traditionally maintained cattle sheds

Improved cattle shed after the program intervention

Poor quality of cattle sheds have not only led to unhygienic conditions, but have also led to wastage of rich resources, like urine and dung. Due to the improper construction of sheds, urine and water flow towards the animals and stagnate in pools deteriorating the quality of urine and cattle manure. This further has a negative impact on the quality of compost

produced. Also, the way the FYM was produced led to a lot of nutrient losses.

Realizing these facts, the Department of Agriculture initiated the cattle shed improvement, as a mission programme in 2013-14. The programme aimed at effective management of cattle manure and urine collection by improving the shed floor, thus enabling improved soil health and plant protection through use of good quality FYM and cattle urine.

Farmer group or co-operatives of districts in co-ordination with respective DADOs were supported to improve cattle sheds along with the construction of urine collection tank and shed for cattle dung. A subsidy of NPR 5,200 per household was provided. By 2015-16, around 33746 improved cattle sheds were constructed and 33746 households, benefited. Proper composting of animal wastes and application of compost to soil have led to better soil health and crop production.

Case of Sindhuli district

Sindhuli District, a part of Province No. 3, is one of the seventy-five districts of Nepal. The district, with Sindhulimadhi as its district headquarters covers an area of 2,491 km². In 2011 the population was 296,192. It is one of the mid hill districts of Nepal, where agriculture is the main source of income.

DADO Sindhuli launched Cattle Shed Improvement program from 2014-15 in the district with the support from SMD. Before the program, farmers were adopting traditional method of composting; collecting cattle dung in small heaps in an unmanaged way, which was then left in direct contact of sunlight and rain. Cattle urine collection was not practiced and it normally infiltrated from the shed floor, as the floor was not cemented. Farmers were not familiar with the benefits of improved shed management.

A village cluster was selected and farmers were oriented on improved management practices of FYM. They were taught about the loss of nutrient from the FYM due to adoption of wrong management practices. Each of the selected farmers was supported to construct urine collection tank with canal, cement the shed floor and prepare a permanent dung collection trench with shade. This simple intervention created a multiplier effect in the village with other famers adopting the improved practices.

> Rearing large herds and managing their wastes has become a challenge in rural communities.

Mr. Buddhiraj Shrestha, one of the farmers of Ranichuri VDC-5 of Sindhuli district made cattleshed improvements. With increased awareness on improved practices, he started applying manure and urine to crop fields. He observed that the soil health improved and the crops started looking healthier. The yields obtained were also better.

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Organic Farming: Manures, *http://agritech.tnau.ac.in/org_farm/orgfarm_manure.html.*

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NEW BOOKS

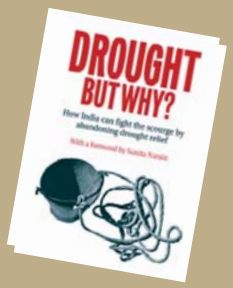
Food Sovereignty, Agroecology and Biocultural Diversity
Constructing and contesting knowledge

Michel Pimbert (Ed.), *2018, Routledge, 360 p.*, ISBN: 9781138955363

Contestations over knowledge – and who controls its production – are a key focus of social movements and other actors that promote food sovereignty, agroecology and biocultural diversity. This book critically examines the kinds of knowledge and ways of knowing needed for food sovereignty, agroecology and biocultural diversity.

'Food sovereignty' is understood here as a transformative process that seeks to recreate the democratic realm and regenerate a diversity of autonomous food systems based on agroecology, biocultural diversity, equity, social justice and ecological sustainability. It is shown that alternatives to the current model of development require radically different knowledges and epistemologies from that on offer today in mainstream institutions (including universities, policy think tanks and donor organisations). To achieve food sovereignty, agroecology and biocultural diversity, there is a need to re-imagine and construct knowledge for diversity, decentralisation, dynamic adaptation, and democracy.

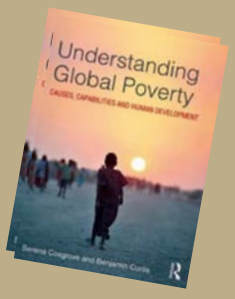
The authors critically explore the changes in organisations, research paradigms, and professional practice that could help transform and co-create knowledge for a new modernity based on plural definitions of well being. Particular attention is given to institutional, pedagogical, and methodological innovations that can enhance cognitive justice by giving hitherto excluded citizens more power and agency in the construction of knowledge. The book thus contributes to the democratisation of knowledge and power in the domain of food, environment and society.



Drought But Why? How India can fight the scourge by abandoning drought relief

Richard Mahapatra, Snigdha Das (Eds.), 2017, Centre for Science and Environment, Price: Rs. 240, ISBN: 978-81-86906-07-1

During 2014-2017 India was shaken by severe spells of drought that hit over 500 million people across geographical regions. Unlike in the past, these droughts did not spare the urban areas; metropolitan cities like Chennai, Hyderabad and Bengaluru declared water emergency and several towns resorted to water rationing. Drought But Why? examines how an occupational hazard has turned into a human-made disaster of unmanageable proportion since organised agriculture began some 10,000 years ago. The book also delves into the experiences of several villages in chronic drought-prone areas of the country that remain unaffected by the scourge. These experiences show that India is a victim of its own policy that revolves around drought relief instead of working towards relief from drought in the long run. These villages offer the new commandments for drought management.



Understanding Global Poverty
Causes, Capabilities and Human Development

Serena Cosgrove, Benjamin Curtis, *2018, Routledge, 290 p., £32.99*, ISBN: 9781138230774

Understanding Global Poverty introduces students to the study and analysis of poverty, helping them to understand why it is pervasive across human societies, and how it can be reduced through proven policy solutions. Using the capabilities and human development approach, the book foregrounds the human aspects of poverty, keeping the voices, experiences and needs of the world's poor in the centre of the analysis. Drawing on decades of teaching, research and fieldwork, this interdisciplinary volume is unique in its rigorous application of the multiple disciplines of anthropology, sociology, political science, public health and economics to the phenomenon of global poverty.

This book is an accessible and engaging introduction to the key issues surrounding poverty, with key questions, case studies, discussion questions and further reading suggestions to support learning. Perfect as an introductory textbook for postgraduates and upper level undergraduates, *Understanding Global Poverty* will also be a valuable resource to policy makers and development practitioners looking for a comprehensive guide to the theoretical frameworks of poverty through the lens of human development.

SOURCES

The Governance of Rangelands
Collective Action for Sustainable Pastoralism

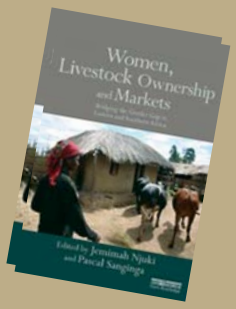
Pedro M. Herrera, Jonathan Davies, Pablo Manzano Baena (Eds.), *2014, Routledge, 298 p., £36.99,* ISBN: 9781138574816

Rangelands are large natural landscapes that can include grasslands, shrublands, savannahs and woodlands. Most pastoralists manage their rangelands communally, benefitting from the greater flexibility and seasonal resource access that common property regimes can offer. As this book shows, this creates a major challenge for governance and institutions.

This work improves our understanding of the importance of governance, how it can be strengthened and the principles that underpin good governance, in order to prevent degradation of rangelands and ensure their sustainability. It describes the nature of governance at different levels: community governance, state governance, international governance, and the unique features of rangelands that demand collective action (issues of scale, ecological disequilibrium and seasonality).

A series of country case studies is presented, drawn from a wide spectrum of examples from Africa, the Middle East, Central Asia, Europe and North America. These provide contrasting lessons which are summarised to promote improved governance of rangelands and pastoralist livelihoods.

Women, Livestock Ownership and Markets
Bridging the Gender Gap in Eastern and Southern Africa



Jemimah Njuki, Elizabeth Waithanji, Joyce Lyimo-Macha, Juliet Kariuki, Samuel Mburu (Eds.), *2014, Routledge, 148 p. £75.00,* ISBN: 9780415639286

This book provides empirical evidence from Kenya, Tanzania and Mozambique and from different production systems of the importance of livestock as an asset to women and their participation in livestock and livestock product markets. It explores the issues of intra-household income management and economic benefits of livestock markets to women, focusing on how types of markets, the types of products and women's participation in markets influence their access to livestock income.

Practical strategies for increasing women's market participation and access to information and services are discussed. The book ends with recommendations on how to mainstream gender in livestock research and development if livestock are to serve as a pathway out of poverty for the poor and especially for women.

Livelihoods and Learning
Education for all and the marginalisation of mobile pastoralists

Caroline Dyer, *2014 – Routledge, 216 p, £37.99,* ISBN: 9781138556300

Current paradigms of 'development' generally serve mobile pastoralist groups poorly: their visibility in policy processes is minimal, and their mobility is constructed by the powerful as a 'problem', rather than as a rational livelihood strategy. Increasingly damaged eco-systems, shrinking natural resources, globalisation and urbanisation all put pressure on pastoralist livelihoods. Such processes often worsen, rather than alleviate, poverty and socio-economic marginalisation among pastoralists, but they also precipitate engagement with forms of education that may improve their future livelihood security and social status, and enhance occupational diversification.

Opening with a discussion of how the relationships between education, poverty and development have been conceived in dominant development discourses, this book reviews the disappointing international experience of education provision to mobile pastoralist groups. Empirically-based chapters drawing on ethnographic research, provide detailed insights into how the Rabaris of Kachchh – a pastoralist community in Gujarat, Western India – engage with education as a social and economic development strategy for both adults and children, and show how ethnographic and participatory research approaches can be used for policy advocacy for marginalised groups.

Livelihoods and Learning highlights the complex, contested and often inconsistent role of education in development and the social construction of poverty, and calls for a critical reappraisal of the notion of 'education'.

Pastoral Parliament

A platform to be heard and seen

Monika Agarwal and **Jessica Duncan**

In India, pastoralists have long struggled to make their voices heard. Cultural and religious differences have exacerbated this situation. But a new initiative is allowing them to assert their identity, identify as a collective, and generate political momentum. The Pastoral Parliament represents a key space for pastoralists to meet, discuss and take decisions about the issues affecting them, without political, religious or caste-based segregation.

Like in many countries around the world, Indian pastoralists represent a diversity of social groups with shared expertise around animal husbandry. This includes livestock breeders, herders and dairy producers. However, they remain the unheard and unseen in local, state and national development agendas. In 2008, to address the political marginalisation of pastoralists, MARAG, a Gujarat-based NGO experimented with the idea of a Pastoral Parliament: a space to strengthen the voice and positioning of pastoralists within governance processes. As a result of years of work with pastoralist communities, and from having pastoralists as core staff members, MARAG was very aware of the fundamental need and importance of such a space.

Equity at the core

The Pastoral Parliament is guided by four core values. First, there are to be no explicit religious, caste, sect, geographic or political affiliations or perspectives promoted. The second value is translated as 'win and help others win', meaning that there should be no conflicts amongst pastoralists: believe in yourself and in others. Third, all pastoralists are to be given equal opportunities in activities of the parliament. Lastly, all aspects of the Parliament are to be inclusive. This fourth value relates to the principle that during the Parliament everyone has equal rights. To promote equal participation, discussions take place in a round seating arrangement and there is no podium.

Photo: Jessica Duncan

Pastoralists reunite lambs with their mothers in Khokhora village after returning from a day of grazing

Restoring dignity and cohesion

In response to the historic lack of collective organisation, the Pastoral Parliament has served as a platform to develop a social movement and collective spirit amongst pastoralists. In the words of Jaisinghbhai, a pastoralist from Kutch, "Pastoral Parliament unites pastoralists. It will also help us to find ways to sustain pastoralism." One indication of this has been the widespread uptake of the phrase Jai Maldhari (Long Live Pastoralists!). The phrase was coined during the second Pastoral Parliament and is now used as greeting and as a rallying cry to unite pastoralists.

One of the most consequential achievements of the Parliament has been restoring dignity in being a pastoralist. These gatherings have helped to reconstruct the lost collective and individual identity of being a pastoralist. In India it is common for people to highlight their affiliations (e.g. caste, sect) on their vehicles. Over the last few years an increasing number of pastoralist youth in Gujarat have started writing 'Maldhari' on their vehicles.

Another notable outcome has been the revival and strengthening of customary norms and traditions, like the sharing of milk. Sharing milk represents a strong custom in many pastoral communities and is accompanied by rules and norms that work to enhance social cohesion. During

the third Parliament an estimated 2500 households from 80 villages contributed 2500 litres of milk, 150 kilograms of ghee and other food items to the Parliament. This set the precedent for the future Parliaments, and subsequent events were organised solely with the contributions of pastoralists.

Women and youth

The Parliament has also been successful in creating spaces for pastoral women to play leadership roles. This has been achieved by ensuring that there are microphones and space for women to talk during parliament. Host communities receive guidance from MARAG and Maldhari Vikas Sangathan (MVS), a community based organisation that has a membership of over 35,000 pastoralists in Gujarat, on how to ensure that the voices of women are heard and acted upon.

Beyond training, this requires that the equal status of women is recognised and accepted in the Parliament. The number of women participants has been less than men, but women have contributed greatly. In the 2016 Parliament in the Kutch district of Gujarat, it was clear that pastoralists cannot succeed in their struggles for land rights without women's participation. With this spirit pastoralist women took more responsibility to assert their land rights. Likewise, pastoralist youth have played a vital role in organising the Parliaments, particularly in extend ing invitations, logistics, facilitation and collecting contributions. Youth have readily accepted the elderly pastoralists as mentors, just as senior pastoralists have recognised youth as potential leaders.

Breaking down barriers

The Pastoral Parliaments also play a key role in conflict resolution. At the 2012 Pastoral Parliament the Sindhi and Dhebar pastoralists, who are historic rivals, were seen together for the first time on a common platform. This signals a greater social and political movement. One of the elderly pastoralists remarked that, "others try to sabotage the community, but the Parliament is bringing everyone together." Indeed, perhaps the biggest success of the Parliament is how it has helped to mitigate boundaries of religion, geography, sect, political affiliation and gender, and has helped to unite pastoralists. There are no comparable initiatives elsewhere.

Gaining ownership

Today, the Pastoral Parliaments are largely organised by MARAG and MVS, with input from the host community. MARAG has worked alongside the hosts to ensure the core values are respected. They have found that until now, training has not been needed as the processes and values of the Pastoralist Parliament are transferred organically. They are passed down and learnt through participation. After each Parliament volunteers from different regions set to work identifying communities that are prepared to host the next event.

What is the Pastoral Parliament?

Pastoral Parliament is a two-day discussion forum organised annually where pastoralists from across Gujarat meet to set a political agenda and address the issues that impact and affect them. The first Parliament was held in 2008. Each time, different communities of pastoralists host the Parliament. The venue, accommodation, and food is the shared responsibility of the host community. On an average, 2000-2500 pastoralist women and men from all over Gujarat attend the Pastoral Parliaments, but the number of attendees is not fixed. Pastoralists from other states have attended the Gujarati Pastoral Parliament, as have various experts. However, the majority of participants are pastoralists from the different regions of Gujarat.

The first Parliament was almost entirely financially supported by MARAG, however by the fourth Parliament, the organising communities were contributing towards all the expenses. The Pastoral Parliament has evolved into a community owned process. Instead of taking cash contributions, each region takes responsibility to collect contributions in the form of food (e.g. milk, flour, ghee, vegetables), as well as bedding and other necessities. This system has led to greater trust and transparency, as well as a sense of local pride and ownership of the Parliament. At the same time, it creates a strong incentive for reciprocation, ensuring the continuation of the Parliament as a community driven initiative.

Challenges

The Pastoral Parliament has matured into a space by and for pastoralists. There is no leader, neither are there set protocols. There is a facilitator, often a youth leader working with MVS or MARAG, to ensure a smoother assembly. While the lack of protocols can be challenging, more often than not this represents an opportunity. As such, the organisation and the events themselves take on unique characteristics reflecting the culture, experiences and needs of the hosts and participants.

Given the success of the Pastoral Parliament, MARAG has started transferring the overall coordination of the Parliament to MVS. As with all community organising, there are lessons learnt that can extend beyond the organisation of Pastoral Parliaments. For example, though it is a flexible process, one of the limitations is lack of a structure. Furthermore, the organising capacity of each community differs. As those engaged in community organisation will also recognise, such

Photo: MARAG

Pastoral Parliament: a space to strengthen the voice and positioning of pastoralists within governance processes

processes do not always develop in a clear and linear way. Flexibility, patience, and understanding are prerequisites to participating and supporting the Parliament.

Growing promise

The Pastoral Parliaments have also provided needed space for pastoralists to identify and set a development and political agenda that can be shared with NGOs, community based organisations and even political parties in Gujarat. For example, the work plans of MARAG and MVS have been directly informed by the mandate of the Pastoral Parliaments. Moreover, the Parliament provides a space where pastoralists can discuss their problems and take action. For example, after participating in the Parliament, Sitaben, a pastoralist from Nakhatrana village took steps to address challenges related to low prices for wool and access to land. He met the District Collector and wrote an application to the Chief Minister.

There is a general sense emerging that now is the right time to begin to develop a two-tier structure of the Parliaments: one at the state and one at the national level. With growing interest in other states to organise a similar process, plans are developing to replicate the process in seven other states of India in 2016-17 and in more than ten states by 2019. Such a platform could serve to bridge the gap between the pastoralist communities and the government at the state and national level and hence improve governance. With emerging interest from pastoralists outside India, there is a possibility to develop a South Asian Pastoral Parliament to act as a legitimate representative voice of pastoralists and to function as a pressure group for pro-pastoralist policy advocacy across South Asia.

Note: This article was originally published in Farming Matters, December 2016 Issue

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