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Mini Review

Livestock Development for Benefit of Small Farmers: Critical Components for Success

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Introduction

Livestock husbandry for sustainable development

Livestock husbandry is an integral part of rural livelihood and a significant source of employment and income generation in many developing countries of Asia, Africa and Latin America. Livestock is also linked closely with the local culture and traditions, which are being followed ever since the domestication of livestock for economic benefits. In India, over 87 per cent farming families are marginal and small land holders, with less than 2 ha land per family, and a majority of them are primarily dependent on livestock for their food security. Globally, more than a billion people have been primarily dependent on livestock for food security and in India, over 142 million families are owning different species of ruminants. However, the productivity of livestock owned by these small farmers has been very low, which has been reflected in the average national production [1]. Low livestock productivity in these developing countries was attributed to several factors such as genetic erosion of the livestock breeds, poor access to technology and resources and lack of infrastructure for an efficient value chain [2]. Under such situations, unable to increase the profitability through increased production, most of these semiliterate and illiterate farmers keep on increasing their herd size, thereby increasing the pressure on biodiversity and environment. While the global policy has been to reduce the ruminant population radically, because of their contribution to Greenhouse Gases (GHG) emission, many developing countries having livestock as a major source of livelihood, are unable to impose this restriction on farmers and deprive them of their primary source of income. Hence, the policy makers have to address this problem of reducing livestock-originated GHG either by providing alternate means of livelihood or by increasing the productivity of the livestock owned by them, by adopting the policy of 'higher production by lower population of livestock'.

As it is extremely difficult to generate alternate sources of employment in villages which are deprived of infrastructure and business network, providing necessary support to improve the productivity of livestock is an easier and sustainable option for the developing countries. Indeed, many developing countries in the recent past have demonstrated that dairy husbandry can be an important means of livelihood and sustainable development for the poor rural communities. India is a good example, where millions of marginal farmers owning less than 1 ha land are rising from poverty by maintaining 2-3 dairy cows or buffaloes [3]. Such success stories can help the policy makers to develop suitable policies to support small livestock owners to improve their income, within a short span of 4-6 years.

Scope for Improving Productivity of Dairy Cattle

Out of the estimated world ruminant population of 4.044 billion in 2019, there were 1.51 billion cattle, 0.204 billion buffaloes, 1.24 billion sheep and 1.09 billion goats [4]. Among them, cattle are very well adopted by most of the ethnic communities. There are more than 100 countries, where the population is over one million cattle, under a wide range of ecosystems, with excellent potential for further development as a commercially viable activity. In 2017, Brazil ranked first in cattle population with 214.9 million, followed by India (185.104 million), United States (93.705 million) and China (83.210). Among 25 top ranking countries in cattle population, 19 countries were developing countries, where a majority of the herds were of small size, owned by farmers having lower income. Among these countries, South Africa, Turkey, Paraguay, Uganda, Uruguay, Niger, Uzbekistan, Madagascar, Chad and Mali had more than 10 million cattle population and where poor farmers were dependent on small herds for their livelihood. Some of the countries having dense population of cattle were India, Bangladesh, Brazil, China and Ethiopia, where the number of cattle per km² ranged from 50 to 200 heads. This population density in the developing countries can be directly correlated to the dependence of farmers on cattle for their livelihood. Cows in these countries are generally maintained for milk, meat, hide, manure and draught power for farming and transportation. In many of these countries, performance of cattle is under stress, due to low productivity, shortage of fodder and feed resources, outbreak of various diseases and poor market development, which need to be addressed on priority.

The world average milk yield of cows is 2200 kg per lactation, while the highest yield of over 10,000 kg has been recorded in Saudi Arabia and Israel, followed by South Korea and USA with an average milk yield of over 9000 kg/ lactation. All the 20 top rankers in average milk yield of cows are developed countries [5]. Among the developing countries, China has an average milk yield of 3300 kg while India has only 1310 kg per lactation. This reflects on the superior genetic base and efficient management systems in the developed countries, where the aim is to produce more milk with lesser number of cattle. Hence, the challenge is to increase profitability, through increase in milk yield, while reducing the cost of milk production and the herd size.

Strategy for Cattle Development in the Developing Countries

While promoting cattle development for dairy husbandry, the primary target should be the small farmers owning poor quality cattle, who need support to improve their profitability through introduction of good husbandry practices and an efficient value chain. This will benefit rural women in particular, who look after their cattle as a micro-enterprise, while taking care of their household activities. Good husbandry practices to improve the profitability in dairy husbandry should focus on the following aspects [6].



Productivity improvement through genetic up-gradation and culling

The cattle owned by most of the small farmers are low productive and nondescript. Often in the absence of regular health care, these animals are likely to be sick due to several diseases. Hence, the primary step should be to screen all the cattle for checking their health and fertility status. Cattle suffering from diseases such as, Tuberculosis (TB), Johnnie's Disease (JD), Brucellosis, etc. should be culled immediately. Cows suffering from infertility should be treated suitably and cows which do not conceive, should also be culled at the earliest. The remaining healthy cattle should be vaccinated regularly against prevailing diseases. Reduction in sick animals will significantly reduce the GHG emission and reduce the burden of feed procurement.

As small farmers do not have resources to buy high yielding cattle from the market, the best option is genetic improvement of the new progeny. In India, crossbreeding of nondescript cattle with exotic dairy breeds such as Jersey and Holstein Friesian, produced very high yielding calves, which came into milk production at the age of 32-36 months and produced over 2000–2500 kg per lactation, which was a ten-fold increase over their dams' production [5]. As the newly born heifers came into milk production, the low yielding cows of nondescript breeds can be culled out. Thus, even the poor families can possess high yielding cows and depend on dairy husbandry for sustainable livelihood. Generally, the farmers maintain their high yielding cows under stall feeding, without letting them out for grazing on community pastures and forest lands. With good feeding and management, they are able to collect 400 percent more dung, which can be used for organic agriculture. This programme of providing breeding, minor veterinary care and extension services at the door steps of small farmers, can be managed by trained paravets under the supervision of a veterinary doctor, attached to a dairy.

Timely health care

With the ownership of valuable cattle, farmers realise the importance of keeping them in good health. Maintaining sanitation in the cattle shed, regular vaccination and immediate care of sick animals, can further improve the yield and reduce the cost of milk production. The government should facilitate easy availability of disease investigation, vaccination and veterinary services at the door steps of small farmers, at an affordable cost.

Feed management

Most of the small farmers are ignorant about proper feeding of their dairy cows. In India about 55 per cent of the fodder is met from crop residues, while the available concentrate feed meets only 25 per cent of the requirement. This clearly reflects on deficiency in feeding. Thus, it is necessary to educate the dairy farmers on feeding. As 70 per cent of the cost of milk production is attributed to feeding, home grown fodder is the most economic source of feed. In India, initially, the recommended fodder crops demanded good quality land and abundant supply of water and most of the small farmers neither had such facilities nor were they keen to change their cropping system and shift from food and cash crops to fodder crops. Realising this problem, drought tolerant seasonal and perennial fodder crops such as *Leucaena*, *Desmanthus*, *Stylo* and other such crops were promoted on denuded lands and farmers were happy to use their

barren lands for such crops. After realising the benefits of feeding green fodder, they initiated various innovations to increase the fodder production. Hence, good extension efforts have to be made to inculcate good animal husbandry practices.

Introduction of new technologies

During recent years, several new technologies have been developed to improve the performance of dairy cows. Significant among these are oestrous synchronisation, early detection of pregnancy, use of sex segregated semen, introduction of bypass fat and protein in the feed, etc. However, some of these technologies, particularly promoted by business enterprises, are expensive and unaffordable. Farmers often oppose new technologies, causing a setback to the programme. For instance, promotion of A2 type milk yielding cattle, by a multi-national Dairy group, by regularly publishing biased reports based on their sponsored research on harmful effects of A1 type milk, made an adverse impact on the production of crossbred calves in India. Thus, the scientists had to make serious efforts to educate the stake holders and convince the government that there are no harmful effects of A1 milk. Hence, the technologies promoted should be based on scientific support and solely in the interest of small farmers.

Development of dairy value chain

An efficient value chain for establishing backward and forward linkages is most critical in the developing countries for efficient procurement of inputs and services and to realise better price for the produce. This is essential where the small farmers are widely spread out in villages, which are prone to exploitation. Most effective approach is to develop village level informal Dairy Producers' Groups, who will then form their Cooperative Federations or Producers' Companies. With such an efficient value chain, the programme can achieve several components of the Sustainable Development Goals of the United Nations.

Conclusion

Livestock development has good potential to promote sustainable development in the developing countries. The aim should be to support the livestock owners to increase production while reducing the population. An efficient organisational network is essential to develop the value chain, which is the key to success.

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