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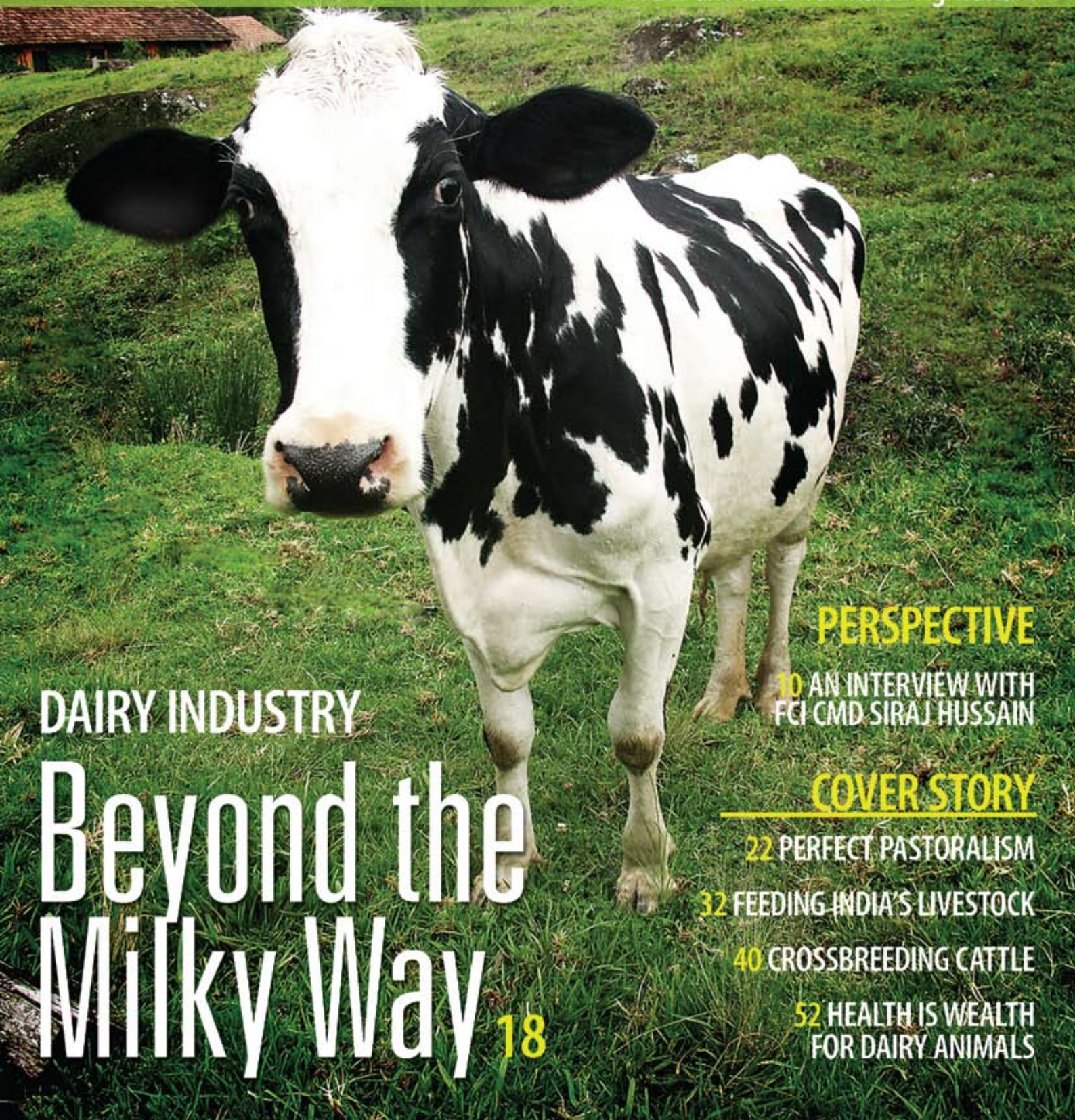
Issues and Ideas for Indian Agriculture



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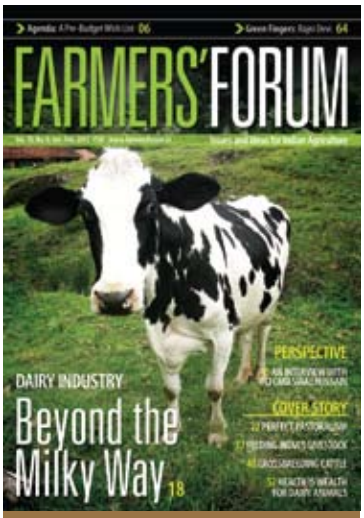

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Robson Oliveira

When Livestock Means Life

Sometimes, the obvious needs to be stated. If indeed India is staring at food insecurity, every intelligent and professionally determined measure must be taken to enhance agricultural productivity. This is hardly rocket science and certainly India's economist Prime Minister and the distinguished Finance Minister do not need to be reminded of this. Yet, it would seem that in every Budget, whilst the government is happy to expend vast sums on subsidies, there is a determined populism when it comes to addressing the genuine causes of farm sector problems. Indeed, there seems to be a strange disregard for the fact that these are parlous times and there is no way that anyone can afford to be a spendthrift, even if for political expedience.

THERE SEEMS TO BE A STRANGE DISREGARD FOR THE FACT THAT THESE ARE PARLOUS TIMES AND THERE IS NO WAY THAT ANYONE CAN AFFORD TO BE A SPENDTHRIFT, EVEN IF FOR POLITICAL EXPEDIENCE

Thus, the subsidy issue is gaining scandalous proportions, especially the fertiliser subsidy that has been in the region of Rs 60,000 crore with a matching amount needed for food subsidy. Then there is the Mahatma Gandhi National Rural Employment Guarantee Act that accounts for another Rs 40,000 crore. The worry is that all these are expected to increase by at least 30 per cent in the next fiscal year. What about the more worthwhile spending of the Ministry of Agriculture? That is restricted to a meagre Rs 15,000 crore. If anything, that is a number that needs to be doubled with a stipulated increase of 10 per cent for the next 10 years and the funds spent on worthwhile projects, some of which have been listed out in the pages that follow. More to the point – never mind the impending elections and the traditional everything-for-everybody manifestos that every party publishes – what is really required in a country that is fast losing its agricultural productivity is to buckle down and do some painstaking and determined work, backed by all the science and technology at its disposal, to turn the productivity clock back for at least the next decade. Mere increase in allocations will not help.

FARMING IS BECOMING INCREASINGLY UNVIABLE. IT IS TIME TO TRANSFORM ANIMAL HUSBANDRY, PARTICULARLY THE DAIRY SECTOR AS THE PRIMARY ACTIVITY AND PLACE IT ON A PROFESSIONAL SCALE

The question of agriculture brings to the fore another critical aspect. Around 70 per cent of farmers across the world are women. In India too, every male farmer has his spouse to share his burden and there are vast numbers of women agricultural workers. In the dairy sector too, 80 per cent of the people are women and dairy is a profession that is secondary to farming. Women are one demographic segment that has to feature in the government's much vaunted inclusive growth philosophy. Therefore, the added need to get these two sectors back on their feet.

With farming becoming increasingly unviable, it is the right time to look at transforming animal husbandry and, particularly, the dairy sector as the primary activity and to place it on a professional scale, as is the practice in globally advanced countries, without India losing its inherent strengths.

Some statistics bring home the point. Poultry is one of the fastest-growing segments of the rural/agricultural sector in India today with an eight to ten per cent annual growth, making India the world's fifth largest egg producer and the 18th largest producer of broilers. Table eggs and broiler meat are the major end products in the poultry space. Organised poultry accounts for nearly 70 per cent of the total output, the rest coming from the unorganised sector in India. This sector picks itself out for special attention. Yet there are problems galore hounding it.

Procurement of good animal stock remains a bottleneck in India. While the country is the largest milk producer in the world, India is nowhere in a position to meet its milk demand that is high and expected to rise by another 50 per cent. Certainly this sector deserves close attention of the Finance Minister, who needs to give an incentive to modernisation and expansion with institutionalisation of professional health care for Indian livestock.

Rajasthan, for instance, subsidises purchase of cattle from other states; the Punjab government refunds the insurance premium for animals and subsidises building of sheds across the state. These are some examples of supportive government activity but across the country help is urgently required to assist the farmer to access quality livestock. Animal rearing can only be profitable if farmers are supported in adoption of scientific practices around stock, feed and upkeep.

What is often forgotten is that many a time, it is the 'secondary' livestock business that has helped a financially troubled farmer to keep his head above water. It is the dairy/livestock income that has provided the safety line when the impoverished, desperate farmer has been contemplating death. ●

Ajay Vir Jakhar
Editor

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Photo: Darias Martin

A PRE-BUDGET WISH LIST

A Bharat Krishak Samaj report

Photo source: www.llbiofuels.com

As Indian agriculture and allied activity gets professionalised there is a satisfying change in the character of the pre-Budget wish list of this critical segment of Indian industry. The focus is on technology, research, education and professionalism. Better management of technology is being considered the key to better economic performance and funds are being sought to finance measures that will enhance productivity.

Economic concessions are, of course, a part of the suggestions but there are specific and well-considered demands that the agricultural community seeks from a wide swathe of ministries and departments.

It includes support for cold chains from the Ministry of Food Processing Industries to increased funding for the Indian Council of Agricultural Research (ICAR) from the Ministry of Agriculture; from requests for incentivising import of semen and embryos for genetic improvement of local livestock from the Department of Animal Husbandry to seeking support for post-harvest management infrastructure from the Ministry of Consumer Affairs, Food & Public Distribution; from requesting the Finance Ministry to offer tax incentives to the private sector for participation in agricultural extension; from demanding crop insurance policies including weather-based insurance to promoting private sector involvement in agriculture extension programmes.

Farmers' Forum brings you a selection of who wants what from whom.

From the Ministry of Agriculture:

1. Increase funding for research institutes like ICAR, state agriculture universities because R&D backing is essential for cost reduction and productivity increase.
2. Special provisions to support agriculture extension system, which has collapsed.
3. Fiscal incentives to states for expanding and reforming agricultural marketing infrastructure with funds linked to introduction of reforms that will give farmers a greater share of what the consumer spends on agricultural goods.
4. Encouragement for states to reduce market charges and levies. If need be, the Union government should compensate the states for the loss of revenue on this account.
5. Money to be earmarked for research in bio-technology to develop less water consuming varieties, drought resistant varieties and those capable of giving higher yield in unstable weather patterns.
6. More funds for IMD specifically for improving weather forecasts for agriculture.

For Animal husbandry

1. Multi-fold increase in funding of animal husbandry sector to increase income through livestock.
2. Government to provide one pair of good quality livestock to every marginal and small farmer free of cost to help the farmer sustain himself rather than be dependent on others.
3. Incentive for import of semen and embryos for genetic improvement of local livestock.
4. Provisions to save local breeds of livestock and farmers compensated for conservation of local breeds.

From Ministry of Consumer Affairs, Food & Public Distribution

1. Incentives for more investment in post-harvest management infrastructure, such as scientific storage and specialised transportation of goods.
2. Permitting options trading of commodities and linking farmers to the futures market.

From the Ministry of Finance

Imports:

1. Allow import of agriculture machinery at zero per cent duty without restriction on size and quality.
2. Remove excise duty on locally-produced farm machinery.
3. Give the private sector tax incentives for participation in agricultural extension.

Budget provision:

1. Doubling the budget for agriculture as the sector is getting neglected.
2. Removing income tax on co-operatives.
3. Removing service tax for organic certification, good agriculture practice certification and other certification services relating to agriculture.

Credit:

1. A professionally drafted long-term policy for agriculture credit, the absence of which is leading to aberration in credit supply in rural areas. Agriculture loan accounts of banks have gone down in spite of substantial growth in agricultural credit between 2003-04 and 2007-08.
2. New loans should be available at three per cent.
3. Repayment schedule of loans should be based on the cropping patterns.

4. There is a need to re-look at mandate of the National Bank for Agriculture and Rural Development (NABARD), which is unchanged since 1982. Instead of just refinancing, allowed direct finance, particularly in the areas where regular banks are defaulting. There is no provision for NABARD to solicit short-term financing.

5. Promote an Agriculture Development Bank on the lines of SIDBI (meant for the small scale sector) with NABARD also playing such a developmental role.

6. Increase actual loans to farmers that now constitute a very small part of what is shown by banks as agricultural credit. Since 1993, indirect loans are also allowed to be treated as agricultural loans as the definition of indirect loans has been broadened to include even the loans given to the state electricity boards for putting up wires and to dealers of products sold to farmers. Thorough verification of bank records needed to check if the banks are not showing non-agriculture loan as agriculture loans.

7. Revise the guidelines and terms and conditions contained in successive circulars issued by the NABARD – the last in January 2006 – on "refinance support for farm mechanisation" that state: "Loan applications shall be appraised on a case by case basis, in terms of incremental income from the proposed investment including income from custom services, adopting among other things, the following norms on 'minimum acreage/minimum hours of work': Each individual or group of individuals to whom a loan/joint loan or group loan is sanctioned should use the tractor/power tiller for cultivation on his/her/their own farm. As regards new/second hand tractor and power tiller, the banks may evolve on their own area-specific norms for financing in regard to minimum land holdings (irrigated/unirrigated) and also minimum number of hours of use, subject to financial viability of the asset created out of bank loan. In the case of power tillers, the banks may ensure that a minimum of 600 hours of productive work in agriculture per year on on-farm or both on-farm and custom services is undertaken by the borrower. Each individual or group of individuals to whom a joint loan or group loan is sanctioned should use the tractor/power tiller etc. for cultivation on his/her/their own-farm."

These guidelines have become a major impediment in making small tractors and/or power tillers available to small farmers in rural areas as a single farmer or a group of farmers. The stipulation of cultivation of "his/her/their own farm" should be done away with so that a rural entrepreneur who does not own land can avail of a bank loan to purchase a small tractor or a power tiller and rent the equipment to large numbers of farmers in his locality. The stipulation of minimum acreage of 6 acres fixed by NABARD for financing of tractors should be done away with and this should be left to the commercial judgment of banks. There should be no requirement of collateral other than the asset itself. Refinance provided to those who purchase farm equipment for renting to other cultivators should be treated on par with credit provided by banks to micro-finance institutions.

8. Create an institution/infrastructure that looks at loans the way Board for Industrial and Financial Reconstruction (BIFR) does for industry. Similar mechanism needed for farmers for factors beyond their control like weather aberrations, floods, drought, pests and such others. Interest charged by banks on warehouse receipts, as high as 11 per cent now, should be brought at par with interest charged from non-defaulting farmers for short-term farm loans.

Photo: Kashfia Rahman

Small farmers' group:

1. Give shape to the National Policy for Farmers, 2007, approved by Government of India, based on the recommendations of the National Commission on Farmers, that suggested mobilisation and organisation of farmers into self help groups to offset the deficiencies in policy and implementation. Prioritise this with requisite funding across six lakh villages.

2. Producer companies set up under Companies Act and following co-operative principles to be given

Photo source: http://cgwb.gov.in

benefits or special consideration of the government or banks. It is extremely difficult to get a bank loan for the producer company. Banks agreeing to give a loan need the board of directors to pledge their personal property and charge exorbitant interest rates. This must be changed.

3. Provision of special interest incentives and investment subsidies for group-oriented initiatives of small farmers or farmer organisations.

Insurance:

1. Crop insurance policies including weather-based insurance need to be revisited in order to provide relief to the farmers in times of increasing number of natural calamities. Crop insurance should be made easy to use so that it can be availed by more farmers.
2. Insurance could be yield-based or based on output rather than based on weather parameters.
3. Extending to all other crops the 50 per cent premium that is borne by the Government of India for coffee and tea.

From Ministry of Chemicals & Fertilisers

1. Incentives for fresh investment in fertiliser industry that has seen no capacity addition in the past decade.
2. Investment policy to fully recognise the expenditure like transportation costs and provide for full gas price compensation instead of artificially fixing floor and ceiling prices based on assumed capital cost figures.
3. Encouraging new domestic manufacturing capacity by the fertiliser sector, capital goods import for machinery should be at zero per cent custom duty.
4. Rational subsidy compensation to new capacity formation to make investment proposals financially viable for bank loans.

From Ministry of Water Resources

1. Increase in allocation by Rs 10,000 crore for irrigation to complete incomplete projects in addition to building new infrastructure.
2. Provide fiscal incentives for command area development and its maintenance.
3. Review all ongoing projects and proposed projects to check if they will actually bring benefit to the farmers as per their project reports.

From Ministry of Food Processing Industries

1. More incentives to agro-based industry and cold chains because present incentive is not enough to jumpstart value addition to agriculture produce and to stop post-harvest wastage.
2. Promote Agro Processing SEZs for value addition to domestic agriculture produce, dairy and poultry processing and to minimize wastage of horticulture and vegetable crops.
3. Allow sale from Agro Processing SEZs to Domestic Tariff Areas without charging any custom duty and such others on processing of raw materials procured from within India. These are important for Indian units to be competitive with units of neighboring countries under Free Trade Agreement.
4. Allow all imports of food processing machinery at zero per cent duty. ●

"Only 54,000 tonnes Damaged Food Stocks... Rats are not the Problem"

Paranjoy Guha Thakurta in conversation with **Siraj Hussain,** Chairman and Managing Director, Food Corporation of India.

Siraj Hussain is a 1979 batch officer of the Indian Administrative Service belonging to the Uttar Pradesh cadre. He was Joint Secretary in the Department of Food and Public Distribution in the Government of India between 2006 and 2010. He served as Vice Chancellor of the Jamia Hamdard University between 2000 and 2005. He is at present Chairman and Managing Director of the Food Corporation of India (FCI). The following are excerpts from an interview originally broadcast on Lok Sabha Television as part of the '1-on-One' programme on October 10, 2010.

Paranjoy Guha Thakurta (PGT): ***How do you respond to the charge in the media that FCI has not done a good enough job in storing foodgrains that were entrusted to it?***

Siraj Hussain (SH): The management of foodgrains in the country is jointly done by FCI and the state governments. In many states, even food procurement is jointly taken up. The responsibility for storage of foodgrains is also shared with the state governments. Till about 2008, the stocks in the central pool with FCI and public sector state agencies were just around the buffer norms or slightly above. In the last three years, wheat procurement has been at an all-time high. In 2009, we procured more than 25 million tonnes of wheat. Rice procurement had also reached an all-time high of about 33 million tonnes in 2009. In the marketing year of 2010, around September, we procured about 31 million tonnes of rice. This, despite the fact that 2009-10 was a drought year, with initial predictions that rice production in the country would be down from about 99.9 million tonnes to about 84 million tonnes.

Given these very high levels of procurement, substantial quantity of wheat had to be stored in covered and plinth (CAP) storage. Somehow, the media has created an impression that the entire stock of wheat kept in CAP storage, mostly in Punjab and Haryana, is at risk. Admittedly, stocks under CAP should ideally not be stored for more than a year but be moved to covered godowns or distributed. For a variety of reasons, we are carrying CAP stocks that are more than one year old. Some stocks, especially those kept by the state agencies, have got damaged. We have declared some 54,000 tonnes of stocks held by various agencies as damaged.

PGT: ***So 54,000 tonnes of foodgrains have got damaged out of a total FCI foodgrains holding of around 60 million tonnes?***
SJ: Right.

PGT: ***Sorry, I have a different figure: the affidavit given by the Ministry of Food and Public Distribution (MFPD) in the Supreme Court of India in the*** **Right to Food** ***case mentions that 70,000 tonnes have rotted in government godowns, including FCI and state government godowns. You are saying that it is 54,000 tonnes under FCI and roughly about 16,000 tonnes with state governments?***
SH: No, there are 54,000 tonnes in state government godowns and about 14,000 (actually 11,000 tonnes) in the FCI godowns. Of the damaged stock with FCI, not all the 11,000 tonnes were damaged by rains or storage under CAP. Some 7,000 tonnes of rice stock was procured below specified norms about three years back. So this accrual of damaged foodgrains, what we call the 'unissueable foodgrains', is not all due to wrong storage.

The figures given by the government in the Supreme Court are absolutely correct and based on the data given by FCI and the state governments on a certain date. These figures are updated every month. On the first of every month we try to collect the latest figures and on that basis we communicate the actual quantity of foodgrains that are found damaged to the government. There may be slight variations.

The term rotted is not very correct; damaged foodgrains means that they are lower than the norms prescribed in the Prevention of Food Adulteration Act.

PGT: ***These 70,000 tonnes have accrued over which period of time?***
SJ: This is the quantity of damaged grains as on August 1, 2010, accrued over three years. Three years back we did not have a very high level of stocks. The stocks have built up only in the last three years.

PGT: ***So, over a three-year period, if foodgrains had not rotted, 1.4 million people, who live below the poverty line, could have been fed for an entire year?***
SH: The term rotted is not very correct; damaged foodgrains means that they are lower than the norms prescribed in the Prevention of Food Adulteration Act. Certain parameters are listed there, uric acid, percentage of damaged grain and such others. Once they are exceeded the grains become unissueable for public distribution system (PDS) but are not unfit for consumption by poultry or animals.

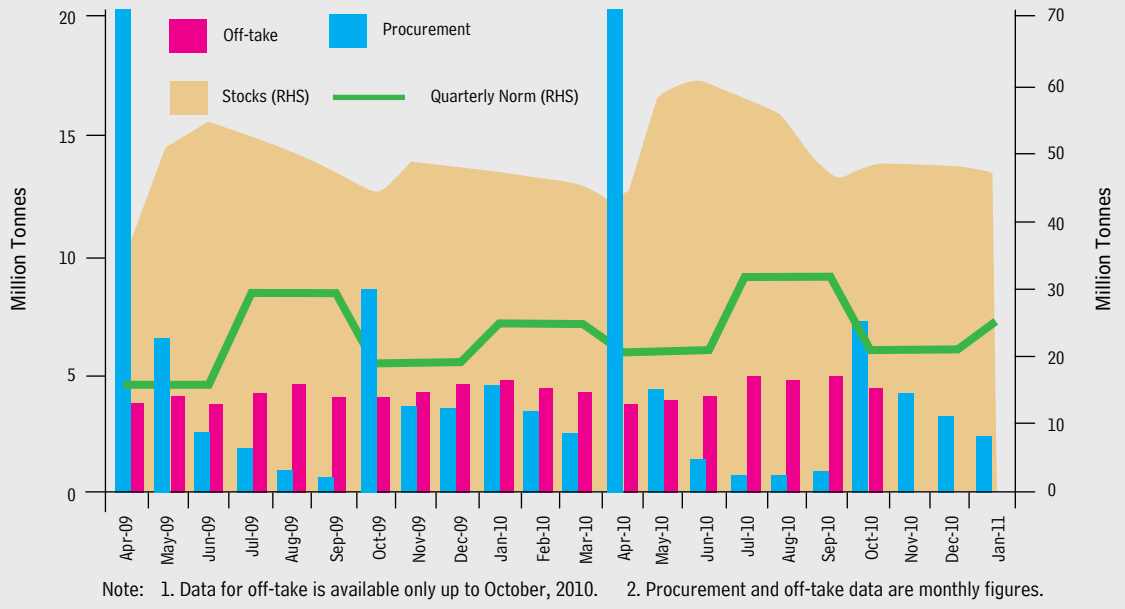
The quantity of damaged grains could have been used under PDS but this is the quantity accruing over last three years and the peak level of stocks, of about 60 million tonnes, was reached about two months (August 2010) back. The all-time high was reached in 2001 or 2002 at about 65 million tonnes. So we are near the peak.

PGT: ***Why is FCI holding on 45 million tonnes over and above what is considered to be the buffer norm/the strategic reserve norm when it is unable to store the grain properly?***
SH: The buffer norms are due for revision. The present buffer norms differ every quarter. The highest level of norms is reached on July 1 when the buffer norm is about 26.9 million tonnes. In addition, there is this norm of strategic reserve, four million tonnes of wheat and two million tonnes of rice. So six million plus this 27 million comes to about 33 million. That is the norm as of now.

PGT: ***You are saying that this is the seasonal variation.***
SH: It is a seasonal variation because at the end of the wheat procurement season (end-June), we reached the highest level of 33 million tonnes. These buffer norms are under revision. They were fixed in the previous plan period and are due for revision by the Government of India (Department of Food, MFPD). There is a technical committee handling the revision. A study was done by National Centre for Agricultural Economics and Policy Research (NCAP) that projected various scenarios. The point to be appreciated is that present norms do not reflect the current reality of a much higher requirement of foodgrains under the PDS and are, therefore, likely to be revised upwards to meet current PDS requirements.

PGT: ***The FCI's foodgrains holding is in the region of 60 million tonnes. Given the excess monsoon, there is expectation of another 30 million tonnes being procured in the coming kharif season, starting beginning of***

Chart 1.1: Food Stocks and its Determinants



Note: 1. Data for off-take is available only up to October, 2010. 2. Procurement and off-take data are monthly figures.

Food stocks with public procurement agencies, though declining in recent months, continued to remain much higher than their respective buffer stock norms and food security reserve requirements. Lower monthly average procurement of food grains, viz., rice and wheat (up to January 14, 2011) coupled with higher monthly average off-take (up to October 2010) resulted in a decline in food stocks in recent months. The total stock of food grains with the Food Corporation of India and other government agencies, which stood at 60.9 million tonnes on June 1, 2010 came down to 47.3 million tonnes on January 1, 2011 (Chart 1.1). The policy on food management has to focus on better supply management in relation to demand, besides addressing the structural capacity constraints in food items.

Excerpt from Reserve Bank Paper: Outlook, *January 24, 2011*

October (2010). What are your plans to store these foodgrains, considering that you have about 60 million tonnes against your buffer norms and strategic reserve that is about little more than half?

SH: Actually the procurement of rice has started from October 1, 2010. In major rice procuring states of Punjab and Haryana, the arrivals have started in October. We expect that in the next one year, up to September 2011, we will procure in excess of 30 million tonnes of rice. Of this, about 25 million would be in kharif crop and about five million would be rabi rice, mostly in states like Chhattisgarh, Orissa and Andhra Pradesh; not in north India. So this 30 million tonnes of rice will not come in October, November or December but be spread over the next 12 months. The procurement of this rice and its storage by FCI and the state governments depends on two things: the off take from the FCI godowns and state agencies every month from now and the additional capacity we add over the next one year.

The Government of India has substantially increased the allocation of foodgrains in the last few months. First, an additional allocation was made to all the state governments for the above poverty line (APL) families at a central issue price that was slightly higher than the current issue price. This means that the wheat was given at Rs 8.45 per kilogram and rice was allocated at Rs 11.85 per kilogram. The government made a second allocation to APL families to all state governments at the normal central issue price. Recently it made an additional allocation of about 2.5 million tonnes to below poverty line (BPL) families.

PGT: ***What is an ideal buffer stock, strategic reserve? Is it 24-25 million tonnes of buffer stock? Should the strategic reserve be four million tonnes? You are saying that this technical committee that includes scientists of ICAR, amongst others, will revise the norms upwards to provide more food to the PDS. What should be a rough figure? What should these norms be?***

SH: This is a technical matter and I cannot talk about it now, though I do know that these norms of buffer are likely to go up. The government was waiting for some firming up of the requirement under the new Food Security Law. The requirement of foodgrains to be stored depends on how much the government wants to distribute through this legislation.

PGT: ***There has been a specific allegation levelled against that FCI that between 2004 and 2006 it actively 'dehired'; did away with millions of tonnes of storage space reportedly because of recommendations made by an expert group, Mckinsey and Co. It is said that if you are building a capacity, you should think in terms of a peak capacity and not be myopic and start dehiring godowns. There are reports that FCI godowns are being used to store liquor, soft drinks while foodgrains are rotting outside.***

SH: Hiring godowns has a cost to it and when we were faced with very high level of stocks, peaking at 65 million between 2000 and 2003, the Government of India decided that FCI and the other state agencies should hire godowns under a guarantee of seven years. Accordingly, about seven million tonnes of storage capacity were hired in various states and about seven million tonnes of storage capacity was hired under a seven-year guarantee scheme mostly in Punjab and Andhra Pradesh. However, from 2006 the stocks came down with procurement at only 9.2 million tonnes in 2006-07. At one point of time, the wheat stocks on April 1, 2006 were half of the buffer norm. We had just two million tonnes of wheat as against the buffer norm of four million tonnes on that day.

PGT: ***What about rice?***

SH: At one point of time even for rice we were slightly below the buffer norm in 2007 or 2008.

PGT: ***So in 2006-07 the food stocks came to a low, below the buffer norm, which is about 24-25 tonnes.***

SH: Actually wheat came below the buffer norm on April 1, 2006. Rice also went below the buffer norm in 2007-2008. At that time substantial capacity hired by FCI and the state agencies remained unused. We were paying rent because we had a seven-year commitment. There were objections in all quarters about wastage of resources and it was a conscious decision of the government and the FCI management of that time that the godowns would be dehired. Not only Mckinsey but other several government reports also suggested that. However, it is wrong to say that stocks are rotting while the godowns have been dehired. These godowns have been taken back on rent and in the last two or three years we have again hired five million tonnes of storage capacity.

PGT: ***Why are the government and FCI persisting with what many would consider a short-sighted policy of getting the private sector to construct godowns under public-private-partnership (PPP) agreements. The question is that if India can build world-class public infrastructure, why can it not build world class food storage infrastructure through the Central Warehousing Corporation and state warehousing corporations. Apparently, this has been done in certain parts of the country including Chhattisgarh. So why are we depending on the private sector?***

SH: That is not true. Actually this is a complex subject and there is not much information available about this in the public domain as to why the investment for fresh godowns should made by the private sector rather than the public sector. The major advantage of constructing the additional requirement through private sector is that the government, through the FCI, is guaranteeing payment only for seven years, now extended to 10 years. After 10 years, depending on the need, we can again hire the godowns or we can dehire the godowns. So we are not creating a permanent liability.

December 2010

Food and Agriculture Minister Sharad Pawar said it would not be possible to implement the proposed National Food Security bill without increasing the country's agriculture production substantially. "If we have to honour the announcement of the President (to bring a new Food Security Law), our requirement will be more than 65 million tonnes. Unless and until, production and productivity has improved, it will not be possible to provide this kind of foodgrains", Mr Pawar said at a press conference.

The foodgrains requirement of over 65 million tonnes is based on the recommendation of the National Advisory Council (NAC) on the proposed bill, under which the President had announced that the government will provide 25 kg of rice or wheat a month to poor at Rs 3 per kg.

– Source: *The Economic Times*

Photo source: www.towncenterwellness.com

The government's decision to invite private investment is well thought out and prudent in the long run. Nobody is suggesting that the private sector would not build international standard godowns

PGT: ***You are creating a guarantee to use the godowns for seven years, now extended to 10 years?***

SH: There are a number of other issues relating to labour, which require a considered decision of the government as to whether this capacity should be created in public sector or private sector. In my personal view the government's decision to invite private investment is a well thought out, prudent decision in the long run. Nobody is suggesting that the private sector would not build international standard godowns. We did have a scheme earlier under a PPP and the Adanis have set up four lakh tonnes of silos in Punjab and Haryana. The Planning Commission is considering how much storage capacity, out of the 15 million tonnes that is likely to be added, should be created through silos.

PGT: ***You may argue that CAP storage can be done well and that it is not possible to create covered storage space or silos for every single grain of foodgrains that is with FCI. Even by FCI norms the CAP cover is good for roughly one year. However, in Punjab, we have 1,630,000 tonnes of wheat in CAP storage that as been through three monsoons. They were procured three years ago in 2008. There are state agencies in Punjab that are holding more than 2.7 million tonnes of grain that have been procured in the rabi season two years ago. So people believe that this is gross mismanagement of food stocks because you should be following principle of first-in-first-out (FIFO).***

SH: We do follow the FIFO principle from April 1, 2010 and have moved out about four million tonnes of wheat from Punjab. There are situations, however, when the principle of FIFO is not followed in its entirety. Now that the new rice procurement season has begun, if there is a godown in an area in which we have to accept rice and supposedly wheat is already kept there and supposing that wheat was procured only this year, then in order to create space for rice that can be stored in open unlike wheat, we have to move wheat that was procured this year. That violates FIFO and yet in exceptional circumstances this has to be moved. In Punjab, particularly, some of the wheat is sometimes stored in unscientific plinths that do not have concrete platform and such protection. It could be a flood prone area for example and it has to be moved on a priority basis. Ideally, we should move wheat that was procured in 2008 before we move wheat procured in 2010.

In Punjab, during the procurement season, there are days when the arrivals are more than 8,00,000 tonnes. In order to create space in mandis, so that farmers do not suffer and pre-empt a law and order problem we have to move stocks directly from mandis to consuming states in relaxation of FIFO. We have sanctioned, on the instructions of Government of India, additional storage for about 15 million tonnes in various states which will fructify in two years from October 2010. Of this, about five million is in Punjab, 3.8 million is in Haryana and some capacities in other states like Maharashtra, Rajasthan, Gujarat and Andhra Pradesh.

PGT: ***You are expecting that this 15 million tonnes of additional storage capacity would be in place by 2012?***

SH: I am hopeful that in the next two years we should be able to build at least 12 or 13 million tonnes of capacity. The country has different options

of using technologies for creating this capacity; either through traditional warehouses or silos. The government and FCI are faced with this dilemma of incurring the cost of setting up a silo or hiring one, which is today about three times the cost of storage paid to the Central Warehousing Corporation for a traditional godown. This will not always remain so high because the cost of setting up a silo may come down if we set up a larger capacity through silos.

PGT: ***Why have these decisions not been taken? Is there a debate or a contention about how you should do it, traditional warehouses versus silos?***
SH: There is a debate on how much capacity should be created through silos and how much through traditional warehouses. For this 15 million tonnes we have gone ahead with issuing tenders for capacity creation through traditional warehouses but there is a study being under taken by Planning Commission to determine the right mix. There is the question of cost and benefit of setting up of silos, such as lower dependence on labour, better quality of storage, lower requirement of land by silos as compared to a traditional warehouse, more modern storage practices, longer shelf life. In a silo you could store a grain up to four years.

The poor districts are really poor; all the indicators show that there is a lot of development to be done. In the poorest districts it is worth experimenting with universal PDS

PGT: ***Right now the National Food Security Act is being debated. What should be the contours of the proposed Food Security Act?***
SH: Ever since we have switched over to a targeted PDS, this has been a matter of debate between various economists and professionals who have an interest in removal of the poverty in the country. I think we must first fix the contours of the availability of the foodgrains because that determines the total quantum that can be procured under the current dispensation of a reasonable minimum support price (MSP).

PGT: ***What is that?***
SH: The procurement of foodgrains depends on the MSP fixed by the government. In 2010, the MSP for wheat was Rs 11 per kilogram. If the government chooses to procure wheat not at Rs 11 but at Rs 15, it will procure everything that is produced in the country.

PGT: ***How do you explain that many of the states that have successfully managed their PDS have either universal or near universal PDS coverage? Is there no lesson to be learnt for the success of PDS in these states for the rest of the country.***
SH: The point is whether a universal PDS at Rs 3 is a feasible proposition because universal PDS, when it was operated, was not at a price that was so highly subsidised and, therefore, even though the entitlement was universal, the actual off take was much less. The universalisation of PDS operations at Rs 3 may not be feasible because the demand on the system will be so high that the requirement of foodgrains would be much more than the 50 million tonnes that we can reasonably procure on an assured basis in the next five to six years.

PGT: ***Would you recommend that in the initial stage around 150 of the poorest districts in India have universal PDS?***
SH: The poor districts are really poor; all the indicators show that there is a lot of development to be done. In the poorest districts it is worth experimenting with universal PDS.

PGT: ***Do you think we should be exporting wheat?***
SH: This is a complex matter. Export of wheat is suggested by a number of economists because of the very high global prices of $300 per tonne. Given the current scenario of an urgent enactment of National Food Security Law it would be imprudent to undertake exports now.

PGT: ***What proportion of stored foodgrains has been eaten up by rats and rodents?***
SH: It is insignificant. Rats and rodents are not the real problem.

PGT: ***The media makes a big thing out of it.***
SH: No. The media has not made a big thing out of rats and rodents. The media has created an impression that all the stocks stored under CAP are at risk. ●

Letters to the Editor

Whither policy cohesion?

Apropos of your Editorial, 'Bespoilt soil, India's fertiliser curse', (Nov.-Dec., 2010), I agree with your comment that lack of cohesion at various levels of policy, strategy, institutional action and development processes have been retarding India's agriculture. My attention and interest has been the area of agricultural research, especially public funded research. The Global Conference on Agricultural Research (GCAR) for Development discussed the issue of investing in agricultural research globally. However, I have rarely come across any documented public discussion in India by the civil society or the private sector on such investment and how it can be made more effective in contributing to agriculture in India. I hope *Farmers' Forum* and Bharat Krishak Samaj will take up and lead this discussion.

Ajit Maru, *Senior Knowledge Officer, GFAR Secretariat, OEKD, FAO, Rome*

Forum for collaboration

As Chairman of the National Agricultural Research System of Kyrgyzstan, I am interested in close collaboration with agrarian communities of India, a country that is a friend to us. I hope that publications such as the *Farmers' Forum* will lead to strengthened integration of farmer's effort across the world on issues around food security through sustainable development of agriculture.

Dzhamin Akimaliev, *Director General, Kyrgyz Agricultural Research Institute Chairman, NARS of Kyrgyzstan*

Calling all policy makers

I read with interest the inaugural issue of (Sept.-Oct., 2010), with great interest and found all the articles brilliantly written, highly informative and readable. I thank and congratulate you for highlighting the issues affecting water management in India and hope that policy makers will implement at least some of the recommendations.

Shivaji Pandey, *Director, Plant Production and Protection Division, FAO, Rome*

New approach

Apropos of Mr T. Nanda Kumar's article, 'Changing Tack', (Nov.-Dec., 2010), I entirely agree with the author that a new system is required to increase the productivity of existing land and the use of rural and urban waste in combination with customised fertilisers and soil testing.

Nathu Lal Jain, *Sirsi Road, Jaipur*

Neither fertile, nor fearless

Apropos of your cover story, 'Oh! For a fertile; fearless mind' (Nov.-Dec., 2010), neither is the government fearless nor is the land fertile anymore. I am worried that inaction by policy makers vis-a-vis streamlining fertiliser delivery systems will make India unproductive and dependent on foreign powers.

Kaushal Kishor Jha, *Samastipur, Bihar*

Indore the pioneer

I read with interest your tribute to Albert Howard, 'Pioneering the organic path' (Nov.-Dec., 2010). We need to re-educate and train farmers who have lost the knowledge they imparted to Albert Howard a 100 years ago. I am very happy that you have highlighted a forgotten fact that the modern worldwide organic movement started in Indore.

Kanhaiya Lal Yadav, *Juni, Indore*

In need of both organic and chemical

I disagree with Vandana Shiva, 'Fertiliser subsidies are for the fertiliser industry; the farmer is just an excuse' (Nov.-Dec., 2010) while I second Sukhwinder Pal Singh Sandhu, the farmer from Ganganagar, in 'Soil is a living and breathing organic matter; take care of it', in the same issue, on the need to use fertilisers in a scientific way along with organic practices. This is the only way to make the soil rich and farming profitable.

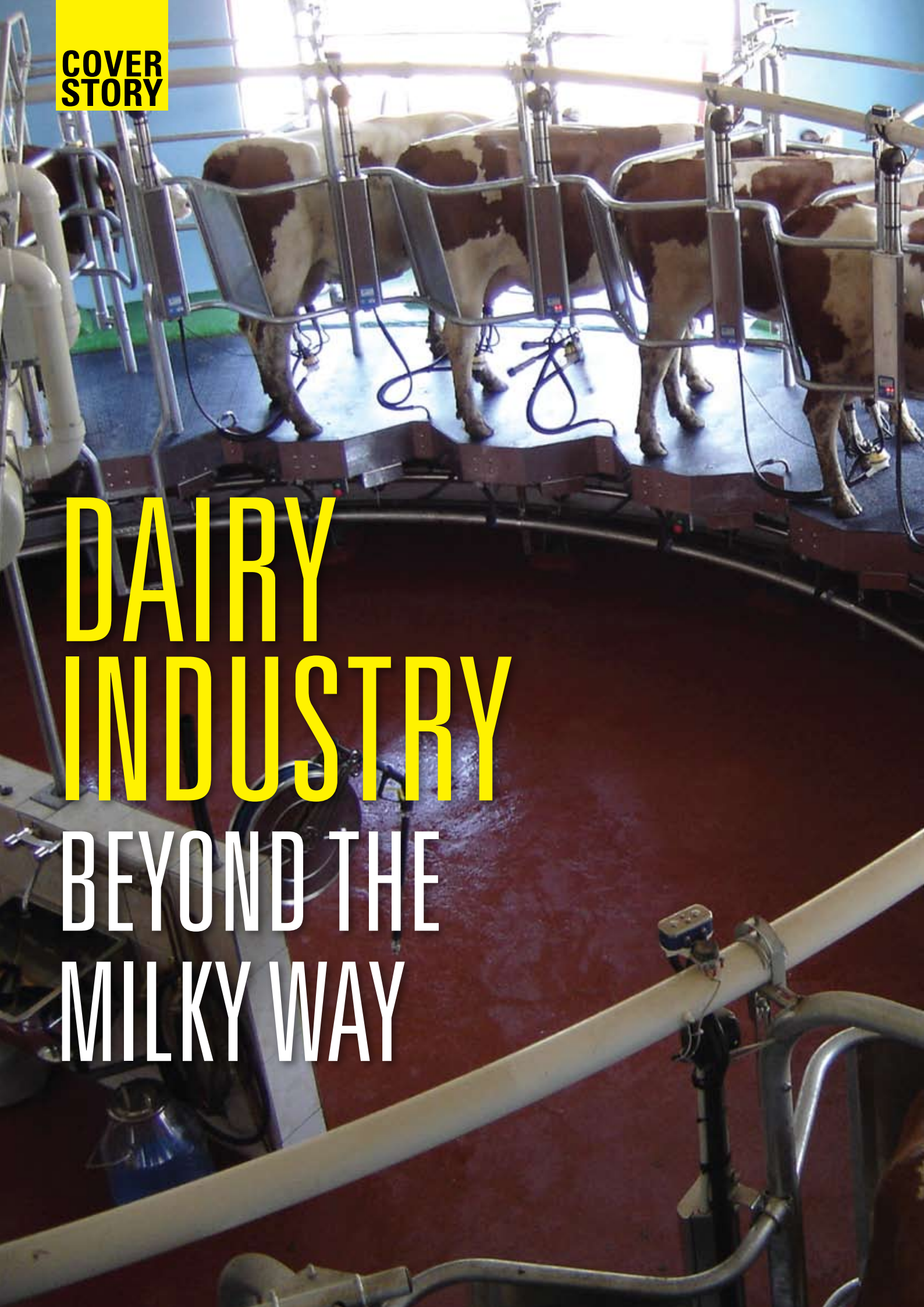
Hoshiar Singh, *Hisar, Haryana*

Nightmarish fertiliser scam

International trade cartels are looting India and the government is not interested in controlling the outgo of subsidy to foreign fertiliser manufacturers, clearly explained by Vandana Shiva in her interview. We need a JPC to investigate why successive governments have, over the years, transferred crores by way of subsidy to foreign manufacturers and traders. Why is the Indian industry's production capacity not being enhanced? This is the mother of all scams. The 2G scam is very small compared to this nightmare.

Rajkumar Singh Hajari, *Bidar, Karnataka*

COVER STORY



DAIRY INDUSTRY

BEYOND THE MILKY WAY

Photo: Hervé Lejeune

The dairy/livestock industry plays a far more important role in the Indian economy than it is given credit for. This is not just from the two obvious advantages that it confers on the people: supplying food – much of it inexpensive and nutritious – and providing critical employment at the grassroots. It has the potential to play a far more important role in terms of making agriculture sustainable through producing farm inputs of an organic nature and, of course, supplementing the farmer's income.

The interesting characteristic of this space is that it can host both the big and small player with potential to absorb huge investments in terms of technology and state-of-the-art practices even while nurturing India's own age old practices. It offers equal opportunities for the biotechnology industry especially because despite all the achievements, the dairy/livestock space is far from reaching its potential in the country. Nor has it successfully met the country's needs even though the 17th Census places India's livestock population at roughly 485 million.

Yet, there are a few distinct advantages offered by the dairy sector in the country, thanks to the substantial production of milk; a good pool of trained human resource; a large consuming market, which is well-defined, and has existed since antiquity with distinct rearing practices. There is now an urgent need to enhance the productivity of Indian cattle to international benchmarks and cross-breeding, with some caveats, to help improve milk yields.

Much has also been said about the opportunities through investments in such different dairy cultures as dairy biologics, enzymes, probiotics and use of permitted colouring for food processing. Besides, there is investment opportunity in the biopreservative space, the dairy and food processing equipment industry, food packaging instruments and, finally, in the market for dairy produce.

In his lead article, 'Perfect pastoralism: towards scientific dairying in India', Sompal, former member, Planning Commission and former Union Minister of State, Agriculture sets the perspective for appreciating the role of the dairying industry and its problems and prospects. An estimated 11.4 million people were employed in the animal husbandry sector in the main status and 11.1 million

in subsidiary status, which is 5.5 per cent of the total working population of the country. Of these 22.45 million, 16.84 million are female workers. In rural areas, 90 million farming families rear over 90 million milch animals. About 73 per cent of households own some form of livestock, which makes it as the most equitable and democratic asset. These numbers emphasise the significance of this industry in the national economy. Clearly, this is not apparently appreciated by managers of the Indian economy. The dairying space is plagued by poor policy, lack of facilities in terms of health care for animals, finances, research, unsupervised cross breeding and a general sense of apathy towards this vital sector.

There is critical need and scope for investing in dairy/livestock wellness industry and this is a special focus area for this edition of *Farmer's Forum*. S. S. Kundu, Head, Dairy Cattle Nutrition, National Dairy Research Institute, says in his article, 'Feeding India's livestock', that there are some ominous portends as far as the livestock space goes. Rapid urbanisation and rising income will drive the huge demand for animal-based food while feed scarcity and costs will emerge as major constraints for increasing dairy animal production. Feed constitutes 60 to 70 per cent of the total cost involved in raising animals and estimates of feed deficit vary between 25 to 40 per cent in green fodder, dry fodder and concentrate ingredients.

Balanced feeding is essential for efficient nutrient utilisation and for reducing methane production from cattle, an important issue in the global mission to combat climate change

There is, thus, a need to judiciously use all available resources for efficient animal production keeping in mind the criticality of livestock not only for economically sustainable farming but the impending climatic changes as well. Balanced feeding is essential for efficient nutrient utilisation and for reducing methane production from cattle and buffalo that are important issues in the global mission to combat climate change. The need of the hour is also to invest in research on fodder for seed production and to develop a precise database on feed and forage availability along with nutrient requirements.

Prof. M. P. Yadav, former Director, IVRI and Vice Chancellor, SVP University of Agriculture & Technology, Meerut and Dr Devendra Swarup, Director, Central Institute for Research on Goats (CIRG), Mathura, discuss issues around management of health in dairy animals, which they say is the most vital factor that significantly influences economic gains and sustainability of dairy farming. Livestock wellness involves a wide range of practices such as preventive measures for infectious diseases, mastitis control, alleviating stress to animals, optimum quality nutrition, shelter management, clean milk production and proper cleaning of the dairy premises. They provide some guidelines to help dairy farmers to maintain their animals healthy and derive better profit from dairy animal husbandry.

Discussing the need for caution while crossbreeding cattle, Dr O. P. Dhanda, former Assistant Director General (AS), Indian Council of Agricultural Research (ICAR) and Prof. K. M. L. Pathak, Deputy Director General (AS), ICAR, in the article 'Crossbreeding cattle: a matter for caution' say that while crossbreeding has contributed towards enhanced milk production in the country, the way forward should be guided by the following recommendations:

- Recognised breeds of Indian cattle, especially milch breeds, should be left out of crossbreeding programmes to be improved through selective breeding only. These breeds should be used to upgrade local cattle in areas having low availability of feed, fodder and other resources.
- Crossbreeding should be implemented only in potential areas having availability of quality feeds at relatively low prices, demand for cow milk, low demand for draught animals and accessibility to veterinary faculties.
- Crossbreeding is recommended for nondescript or low-producing animals.

A quick survey of today's scenario vis-à-vis the status of crossbreds in rural India does not seem to suggest that all aspects pertaining to implications of crossbreeding have been taken care of, says S. P. Singh, former Director, Project Directorate on Cattle (PDC), ICAR. The unplanned and uncontrolled breeding policy, devoid of statutory regulations, has

proved to be disastrous in several ways. Not only has India nearly lost many elite, indigenous breeds but it has a heterogeneous cattle population in rural India that is unfit for future evaluation, selection and improvement.

In 2005, *Dairy India* estimated the size of India's dairy sector at Rs 227,340 crore (valued at consumer prices) with the largest contribution from liquid milk (at Rs 82,835 crore), followed by *ghee* (Rs 22,980 crore), *khoa/chhana/paneer* (Rs 24,100 crore), milk powder (Rs 4,680 crore), table butter (Rs 770 crore), cheese/edible casein (Rs 975 crore) and other products such as ethnic sweets and ice-cream (Rs 9,100 crore). Of the milk production of 94.5 metric tonnes (mts), 77 per cent (73.1 mts) is sold as liquid milk, with the remaining 23 per cent (21.4 mts) converted into products. Further, the organised industry handles only 18 per cent (17 mts) of milk, with 36 per cent (34.5 mts) being handled by private *dudhias* (milkmen) and unorganised players and 46 per cent (43 mts) being retained in rural areas. Within the 18 per cent organised sector share, private and co-operative/government dairies handle 8.5 mts each.

Dairy India also projected that by the end of the current year, the industry will be valued at Rs 520,780 crore with the organised industry's share of total milk handling going up to 30 per cent (36 mts) and the small players witnessing a dip in its share to 22 per cent (26 mts). Besides, higher rural incomes will marginally boost the share of milk retained in rural areas to 48 per cent (58 mts). Also, within the 30 per cent overall share of organised dairies, 20 per cent (24 mts) will be accounted for by the private sector. The co-operatives and government dairies will handle 10 per cent (12 mts) of milk, which will be lower than that of the organised private sector.

The point is that the composite potential of the dairy/livestock industry is enormous in terms of wealth creation and overall well being of the people, especially in the economically dispossessed category. The livestock sector includes animal husbandry, dairy and fisheries and good progress in this sector will impact favourably on this demographic segment. An estimated 70 per cent of the livestock market in India is owned by 67 per cent of small and marginal farmers and those who have no land. This makes the sector especially significant from the inclusive growth perspective that has been the centrepoint of India's development strategy.

That, if nothing else, should force the government's attention to this sector. It needs incentives to professionalise and support systems for animal care, investment in research and hand holding as fruits of research and knowledge are brought to bear on the industry. ●

COVER STORY

Photo: Dilip Banerjee

PERFECT PASTORALISM

Towards Scientific Dairying in India

Sompal

Livestock rearing has been an integral component of agriculture since time immemorial. Historically, pastoralism predates cultivated mountain areas. Pastoralists have always mainly depended on domesticated animals as their source of livelihood. In spite of the great progress of agriculture in India in recent times, livestock continues to play a vital role in the national economy and socio-economic development of the country.

About 200 tribes that comprise approximately six per cent of the total population of the nation are exclusively pastoral. They include *Raika, Rebari, Charan, Bharwad, Gujjar, Gaddi, Kanet, Bhotia, Kinnaura, Sherpa, Changpa, Ahir, Rajput, Maldhari, Meghwal, Jat, Gairi, Mer, Kutchi, Vagariya, Bhopa, Sorathi, Gujarati, Maru, Dheberya, Gadaria, Gadwar, Dudh Gujjar, Bakkarwal* and many others, who live mostly in the arid and semi-arid areas having 100 to 600 mm annual rainfall as well as in the mountainous regions. Many are nomads and travel long to medium distances every season for grazing their animals: cattle, sheep, goat, camels, yaks, mules, horses and even donkeys.

Employment generation

The livestock sector offers a significant potential for generating gainful employment, supplementing family incomes and providing locally available and inexpensive nutrition in the rural areas, particularly among the poor landless, marginal, small and women farmers. Animals are supposed to be the ideal fall back during the natural calamities like drought, famine and floods. They are good cashable assets too and offer valuable stock and potential for trading.

According to the National Sample Survey Organisation's (NSSO) 61st round (2004-05) survey, an estimated 11.4 million people were employed in the animal husbandry sector in the main status and 11.1 million in subsidiary status, which is 5.5 per cent of the total working population of the country. Of these 22.45 million, 16.84 million are female workers. In rural areas, 90 million farming families rear over 90 million milch animals. About 73 per cent of households own some form of livestock, which makes it as the most equitable and democratic asset. Gender equity is more pronounced in the livestock related sector, as women's participation is 71 per cent of the labour force, while in crop farming it is only 33 per cent. The number of women engaged in livestock work is 75 million as against 15 million men. They play a major role and possess good knowledge about animal behaviour, feed habits and diseases. In many areas and communities, women even handle the marketing of livestock products. The Central Statistical Organisation (CSO) estimates for the year 2006-07 put the contribution

of livestock and fisheries sector together as 31.7 per cent of the total agricultural gross product (AGDP) and 5.26 per cent of the national GDP.

In the arid areas, the contribution of livestock to agriculture GDP is as high as 71 per cent, while in semi-arid areas, it is in excess of 40 per cent. In addition to highly nutritious food items, livestock supplies important raw materials such as hides, skins, blood, bones, intestines and fat for various industries. The value of milk alone during 2006-07 was estimated to be Rs 1,44,386 crore as against Rs 85,032 crore of paddy, Rs 66,791 crore of wheat and Rs 28,488 crore of sugarcane.

Thus, milk is the largest agricultural commodity of India accounting for 67 per cent of the total livestock GDP and 18 per cent of total agricultural GDP. The milk sector has witnessed tremendous growth in the post independence period. From a mere 17 million tonnes (mts) in 1950-51 the production has reached 108.5 mts during 2008-09, raising milk availability from 114 gm per capita per day to 258 gm. For more than a decade, India has consistently ranked as the top producer of milk in the world. Export of milk and milk products accounts for 17 per cent of the export of all livestock products.

Milk is India's largest agricultural commodity. It accounts for 67 per cent of total livestock GDP and 18 per cent of total agricultural GDP, and has grown post-independence

Cattle rich

India also ranks first in having the largest number of cattle and buffaloes (16 per cent and 57 per cent respectively of the world population), second in goats and third in sheep. We also have the richest and most valuable biodiversity in terms of animal genetic resources. There are 32 native breeds of cattle, 14 of buffaloes, 40 of sheep, 20 of goats, eight of horses, six of camels and 18 poultry birds, which are in demand the world over because of their unique features in terms of ability to derive maximum energy from ordinary feed/fodder, high natural immunity to disease and infection and resistance to survive in acute weather conditions and temperatures.

These breeds have evolved according to the climatic and ecological conditions in the particular agro-ecological regions. Similarly, the management, feeding practices and indigenous healthcare systems too are closely linked to socio-economic, cultural and marketing traditions and natural flora and fauna found therein. Their unique natural features in terms of ability to derive maximum energy from ordinary feed and fodder, high resistance and immunity to diseases and infections and capacity to survive in extreme weather conditions and temperatures, creates a demand for them the world over. Therefore, they have a great potential for international trade, which has never been utilised.

Milk, since ages, has been considered as the most wholesome food and a rich source of nutrition for the poor as well as the rich, more so in the preponderantly vegetarian country like ours. Various milk products like curd (yogurt), buttermilk, butter, cheese, *ghee*, *paneer*, *malai*, *khoya* and such like have all been used directly and for making delicious dishes such as *kheer*, *sevaiyan* and numerous sweets and condiments. Perhaps no other country makes use of milk for such a variety of edible items.

From time immemorial

In ancient Vedic Sanskrit literature including the four Vedas and the Upanishads, profuse references are found to laud milk and milk products for their nutritional and curative properties. Milk has several synonyms like *dugdham, ksheeram, payasam, stanyam, gorasah, gavyam, dohah, avadohah, udhasyam, udhanyam, dohajam, dohapanah, piyusham, payasyam, peyam, somajam, amritam* among others. Ayurveda lists and prescribes use of milk and milk products not only for nutrition but also for curing many chronic ailments. *Dugdha kalpa, takra kalpa, ghrita kalpa* are protracted therapies for purging toxicities and rejuvenating human physique and brain.

A number of traditional medicines prescribed by all the Indian systems of medicine including, *Ayurveda, Unani, Tibbi, Sidha, Amchi* and folk and tribal, are required to be administered with milk and specific milk products to obtain desired benefits. Milk and its products and byproducts are supposed to possess many healing properties when applied externally too. They are used in worship and fed on special occasions like marriages. One of the preparations known as *madhuparka* is a concoction of milk products and honey and is deemed to be beneficial for enhancing potency. Cow milk is considered as

Photo: SCapture

closest to mother's milk and thus most compatible with human physiology and easiest to be assimilated by human metabolism.

Organic inputs

In addition to milk, the livestock provides the most valuable holistic organic manure containing almost all nutrients and micronutrients in ideal proportions that are vital for sustaining soil fertility and producing healthy chemical free and naturally tasty food items. It allows the farmer to reduce dependence on artificial inputs like chemical fertilisers and thus keep cost of production minimum. This assumes great significance when the Indian soils are experiencing depleting fertility and the farmers, diminishing returns caused by progressively deteriorating input-output ratios.

This is also the only viable and practical solution of the vast toxicity in the whole food chain on account of use of various agrochemicals responsible for causing various chronic diseases and immune disorders. Some 800 mts of manure is produced every year, 300 mts of which is burnt as fuel. It offers a huge potential if the animal excreta are utilised for generating biogas. Animal urine is tested to be a perfect substitute of nitrogenous fertilisers. Preparations like the *amritpani* prepared from animal urine, *ghee*, milk, butter and *gur* and honey etc. even in very small quantities has been found to be enhancing microbial population and activity, which is responsible for converting soil nutrients and mineral into plant available for, and beneficial for restoring soil fertility.

The multiple species animal husbandry system is also environment friendly. Cow urine has been used by Ayurvedic system for curing liver disorders, healing wounds and said to be of benefit in cases of cancer. Animal draught power is an eternally sustainable source of energy. It has been estimated to be supplying energy equivalent of 44,000 MW of electricity, and its use is quite prevalent to haul short distance loads in rural and semi-urban areas. Bullocks and male buffaloes are used to cultivate 60 million hectare of cropland.

All animals have traditionally been viewed with great compassion and respect in the Indian culture and almost all of them are worshipped. The cow, however, has been accorded a very special status. It is invariably revered and worshipped across the

regions. Vedic lore has equated the cow with mother and mother earth. It is called as *gomata vasundhara.* As many as 99 synonyms and attributes of cow are found in the ancient Sanskrit language. Its utility is supposed to be infinite, and therefore the proverbs like *gostu matra na vidyate* and *gomaye vasati laksmi,* which respectively mean that the benefits of cow cannot be quantified and that wealth resides in its excreta.

Vedas, accepted as the oldest scriptures of the world, bestow profuse praise on the animal and ordain that it must not be killed (*Gavo ma hinsi)*; and that the killer of cow should be punished with death sentence (*Seesen vidhyama).* Goat (*aja),* sheep *(avi or mesha),* horse *(ashva)* and camel *(ushtra)* are mentioned fondly and praised for their various uses including for yielding wool. Their milk, according to Ayurveda, possesses unique properties to cure ailments like liver disorders, diabetes and impotency. Parallel to Ayurveda, we have a long standing written and oral tradition of treating animal and plant diseases and feeding practices.

Historically then, livestock has played an important role in people's livelihood and culture, and continues to do so even presently. The sector, however, faces numerous problems and is unfortunately one of the most neglected in matter of government policies. Firstly, it is highly segmented and a vast majority of livestock rearers belong to the under-privileged section of our society. They represent a sizeable population and as already stated contribute to the rural and national economy substantially, but have very limited, rather negligible alternative opportunities for development.

Threatened sector

As an economic system, pastoralism in India is highly and constantly threatened, acutely under-funded, poorly documented, under-researched and unsupported. It has been suffering from serious lack of appropriate government policy or programme even in the post independence era. A small number of fragmented schemes launched by the government have either been counterproductive or failed to create a tangible impact. On top of it, the Ministries of Agriculture and Environment & Forest have adopted and maintained an oblivious and anti-livestock stance all through. Especially, the Ministry of Environment & Forests, has been totally hostile to the livestock sector and always deemed it as the destroyer of environment, of which it has been part and parcel since time immemorial.

Poor policy support

No economic development can ever take place in absence of capital investment – private or public. All modern governments are supposed to work out policies that are conducive to private investment and also clearly earmark public funds for activities that are not attractive for private investors. However, public investment in livestock sector has been abysmally low and never commensurate with its contribution, potential and future development. More disturbing, in recent years, it has shown a downward trend. The lack of thrust and focus is highlighted by the fact that budgetary allocations to animal husbandry and dairying as percentage of total plan outlay varied from 1.2 per cent during the First Plan to about 0.18 per cent in the Ninth Plan compared to more than five per cent contribution to the national GDP.

Private investment is predicated on the economic viability and profitability of a venture.

- First, the size of livestock operation in India is too small to be viable.
- Second, the majority of owners come from very poor and under-privileged class having no capital of their own and not considered to be credit

Schemes and programmes for fodder and feed development are quite limited and performance of government organisations in this regard has been found to be unsatisfactory

worthy by financial system. Credit support for buying and maintaining animals is not easily available. Access to marketing support is very poor; so are the prices received for their products. Usually, majority of milk producers get only 50 per cent of the price paid by the consumers.

- Third, availability of and access to modern livestock services like veterinary and healthcare too are highly inadequate, both in terms of reasonable distance and appropriate time.

Resource crunch

The very basic resource, good quality animals that would niche well with the underprivileged socio-economic and fragile agro-ecological adversities, is not available. An efficient and regular reliable market for cattle is totally non-existent. Feed and fodder availability is a major constraint. By and large, Indian livestock, particularly in arid, semi-arid and hilly regions, survive on crop residues and agricultural by-products. The area under fodder cultivation is a meager 4.6 per cent of total cultivated area. Green fodder is available to a very limited number of animals and only for a limited period during the year. Concentrates and nutritious feed can be afforded only by a few organised and rich dairy farmers, vast majority cannot even think thereof. As a consequence, milk yields are sub-optimal and a huge potential remains unutilised. The schemes and programmes for fodder and feed development are quite limited and performance of government organisations in this regard has been found to be unsatisfactory.

Poor breeding standards

India's breeding policy has been faulty right since beginning. First time during the Third Five Year Plan, a policy was put on paper, which envisaged conservation and improvement of the indigenous

breeds. The other component of the programme was to crossbreed the nondescript cattle with exotic breeds, so that their milk yields could be raised from 1-2 litres to about 4-5 litres per day. In course of time, however, the first more important component was completely dropped and all the elite descript breeds were crossed with exotic germplasm. The results have been disastrous.

Lost breeds

Despite various claims of developing crossbred animals, no stable breed has yet been developed. Names like Frieswal, Karan Swiss and such like were heard but there is not a single animal that can subscribe to the description. More horrifying is the news that almost all of India's descript breeds are lost. Out of about 37 descript indigenous breeds, seven have are reported to be extinct. There is no way to retrieve the loss and there is no one who can be held responsible for the catastrophe. At whose behest this gross aberration took place is not known.

After much debate and discussion, the National Project on Cattle and Buffalo Breeding was launched in year 2000 for a period of 10 years aimed at conservation and up gradation of indigenous breeds and evolving a sustainable breeding policy. First, it left out the other important species – goats and sheep, which should have been included. Second, the feedback and information about the progress and impact of the project so far are not at all encouraging.

Artificial insemination

- As part of the package, the servicing practice too was completely switched from natural to artificial insemination (AI), which has given rise to several problems in the field.
- First, the AI services are neither available nearby nor timely.
- Second, the farmer has no choice in the matter of breed and or quality. He has to accept whatever is available.
- Third, the arrangements to store frozen semen and the power required there for are not adequate.
- Fourth, there is acute shortage of trained personnel.
- Fifth, there are no means to check whether the semen offered is disease and infection free and retains motility at the time of service.

Surveys and studies on the ground indicate that about 70 per cent AI fails and, therefore, farmers have started preferring natural service by the bulls, which too are not to be found as with the advent and propagation of AI the rural communities stopped rearing bulls.

Expert breeders and practical experience tell that natural service is definitely superior on several

counts. First, because both the male and female have an innate sense to recognise the optimum heat and time of service, which artificial inseminator can never do. Second, the natural service imparts fresh and motile dose of semen. Third, the breed is identifiable and ascertained. AI on the other hand results in loss of biodiversity. Another disastrous consequence has been the import of serious exotic diseases like infectious bovine rhinotrachiaitis (IBR), which is a genetically transmitted disease brought in with imported exotic semen.

Serological survey

A serological survey conducted by none other than the Indian Veterinary Research Institute, Bareilly, found that more than 50 per cent of the crossbred cattle in the country have been afflicted by this disease, which is spreading to other animals. The report has not been taken cognisance of and no measures seem to have been initiated to check the semen health in future. AI also fails to satisfy the sex urge of female cattle and might in the long run affect the sexual, mental and physical health of the animals. Some scientists attribute the denial of natural sex as one of the possible causes of diseases like the mad cow disease. Maybe it is too early to say so but this subject needs to be researched. That has not been thought of at all.

Global experience

A brief mention of the comparative merits and demerits of the native indigenous and crossbred cattle would be worthwhile. Nobody doubts the fact that the crossbred cows are capable of yielding more milk. Yet everybody agrees that crossbreeding should not be carried out at the cost descript indigenous breeds. It should have been confined only to nondescript stray animals only as envisaged originally in the Third Plan. Equally or more important should be the concerted upgradation and improvement of the native breeds within their natural tracks through selective scientific breeding. This is what the developed countries have done to improve their own breeds. Not only this, some of them including USA, Latin America, Australia, New Zealand and Bulgaria have taken away some of India's breeds of cattle like Sahiwal, Gir, Kankrej, Tharparkar, Haryana and Murra of buffalo to their respective countries and rear and manage them much better than India does. One has seen this for oneself.

More than 70 countries want many Indian species, which offers a huge scope for trade. It must also be understood – to some extent this has been proved by India's experience – that even the crossbreeding programme cannot be sustained without good quality indigenous animals. This is why conservation and improvement of Indian breeds is essential.

The indigenous breeds are better adapted to the weather and socio-economic environment of various agro-ecological regions of India. They have decidedly superior capacity to thrive on ordinary feed and fodder. They are easy and less costly to maintain and have better resistance to vagaries of nature and disease and infection. The crossbred ones are more susceptible to disease and need extra care and artificial environment to sustain. Therefore, the cost of producing milk in case of the indigenous ones is much lower. Unfortunately, no systemic studies are available on these aspects.

More than 70 countries want Indian species, which offers a huge scope for trade. It must be understood that crossbreeding can't be sustained without good quality indigenous animals

On a visit to the Military Dairy Farm at Meerut in 1998, this writer was informed by the officer-in-charge that the cost of milk production of the crossbred Frieswal cows on average was Rs 11.70 per litre, while that of Sahiwal was only Rs 9.76. Also, the fat and solid-not-fat (SNF) contents of indigenous cows were substantially higher. The incidence of tuberculosis and other diseases too was higher in the crossbred.

Need for research

Another subject of hot debate in various developed countries, particularly New Zealand and Australia, is the type of Beta Cassein found in the milk of various breeds. The milk of HF and other European breeds is supposed to be having Type-I, which is responsible for many crippling diseases like autism, etherosclarossis, liver disorders and choking arteries; while the Zebu breeds, as all the Indian breeds are called, yield milk having Type-2, that is not harmful. This is a researchable issue. Indian scientists must look into this phenomenon and come out with clear findings.

Parliamentary Committee on Agriculture studied the subject in 1992-93 and found that milk prices received by farmers took eight years to move from Rs 4.20 per litre to Rs 5.60

NDDB's role

The government policy on milk pricing and processing has been equally flawed. As in case of other agricultural commodities, the pricing policy was dictated by the interest of vocal urban consumers. Guided by this objective, the NDDB was granted exclusive favour and monopoly of importing milk products, mainly dry milk powder and later butter oil too, which was mixed, sometimes up to 70 per cent and perhaps even more, with indigenously collected milk to create the much applauded Operation Flood-I, II and III. This adversely impacted the prices realised by the Indian farmers.

The Parliamentary Committee on Agriculture studied the subject in 1992-93 and found that milk prices received by farmers took eight years to move from Rs 4.20 per litre to Rs 5.60, which were wholly unremunerative. Over the same period, the minimum support price of wheat had been increased from Rs 85 to Rs 375 per quintal. The most interesting part was that the best milk producing areas of the country had been reserved for the Nataional Dairy Development Board (NDDB) marked as 'Operation Flood' areas, in which no other processing unit was allowed to be set up.

Also, the NDDB kept importing milk powder and butter oil that were donated by the European Economic Community (EEC) free of cost to get rid of the huge surplus stocks accumulated for several years, and had been declared unfit for human consumption. With the blessings of the government, the NDDB minted money by selling these free of cost commodities at cheaper prices to urban consumers and destroyed the micro economy of Indian Milk producers. It never bothered to estimate the cost of milk production as is done by the CACP in case of food grains and other commodities covered by the minimum support price (MSP) regime and thwarted competition by prohibiting the entry to milk processing business.

The NDDB neither undertook to lift all the milk produced and offered by the farmers, nor allowed other to process it. The Parliamentary Committee found that Bulandshahar district, which at that point of time was the highest milk producing district of

Photo: Timo Balk

the country, was producing 10 lakh litres per day. All the organised sector units including NDDB, Delhi Milk Scheme and the Uttar Pradesh public sector undertaking were together able to lift only less than two lakh litres but no new private sector operator was allowed to set up a unit.

On the recommendation of various Parliamentary Committees, in 1994, the Government of India decided to do away with the licensing system. Soon after, however, the NDDB succeeded in bringing it back through the Milk and Milk Products Order (MMPO), which gave policing powers to the extra-constitutional NDDB. The draconian provisions of the MMPO were abrogated in 1998. This is only a brief account and can be an interesting subject of study to put the much eulogised role of NDDB and 'Operation Flood' in its right perspective.

Need for freedom

The progress made by the milk sector in recent years would not perhaps have been possible unless the milk processing industry like all other industries was freed of the shackles of licensing and granted monopolies. Enhanced competition has definitely helped prices received by the farmers to go up. Recent hikes in prices though are being objected to by urban consumers but are moving in the right direction. They are going up to catch up with the other prices, which in economics is known as adjustment of historically adverse terms of trade to which the milk producers were subjected for a long time. Actually, these are yet not really remunerative. It may be interesting to note that farmers are getting only about 50 per cent of what consumers are paying. Nobody has ever bothered to calculate the cost of milk production.

It may be said from personal experience that the current price of Rs 34 for the full fat milk is not at all sufficient to make even a break even, not to say of profit if all the costs including that of investment and attrition of assets are taken into account. Lack of institutional credit, suitable insurance system, marketing facilities for milk and other products as well as animals, certified good quality animals, proper feed and fodder, veterinary and healthcare services are the constraints that are experienced by dairy farmers equally in all regions of the country.

Having a comprehensive policy encompassing all these aspects and putting in place pragmatic specific programmes can help the economy to grow at a much faster pace and make the process of economic development really participatory, democratic and inclusive, and address the issue of poverty and food and nutritional security tangibly in a short time. The programme has to cover all the species and all the breeds. The small ruminants need to be given due place and importance. ●

The author is a former Member, Planning Commission and former Union Minister of State, Agriculture.

COVER STORY

FEEDING INDIA'S LIVESTOCK

In Need of Support from Technology

S. S. Kundu

Photo source: www.kvkbaramati.com

Indian agriculture is currently at the crossroads, seeking the way forward to accelerated growth. Amongst the areas that need attention is enhanced livestock production to achieve sustainable productivity without adversely affecting the environment. There are some ominous portends as far as the livestock space goes: (a) rapid urbanisation and rising income will drive the huge demand for animal-based food that the industry may not be able to meet (b) feed scarcity and costs will emerge as major constraints for increasing dairy animal production.

The first is an outcome of evolving lifestyle and eating habits. The second is a matter of adequate nutrition for the well-being of livestock and poultry. Such nutrients as carbohydrate, protein, fat, mineral, vitamin and water should form an essential part of the livestock diet but both feed and fodder supply for farm animals in tropical regions and Indian subcontinent fall short in quantity and quality. This is usually ascribed to insufficient and uneven distribution of rainfall, soil quality, pressure of burgeoning population of man and animals.

Feed constitutes between 60 to 70 per cent of the cost involved in raising animals and estimates of feed deficit vary between 25 to 40 per cent in green fodder, dry fodder and concentrate ingredients. There is, thus, a need to judiciously use all

available resources for efficient animal production, keeping in mind the criticality of livestock not only for economically sustainable farming but the impending climatic changes as well. Balanced feeding is essential for efficient nutrient utilisation and for decreasing methane production from cattle and buffalo rearing. There are some important issues that need to be borne in mind:

- Lack of one nutrient triggers wastage of other nutrients. Carbohydrates, an energy source, cannot be utilised without the optimum level of protein and vice versa. This holds true for almost all of 40 or more nutrients.
- Feeding animals in excess of requirements may lead to toxicity, as in case of inorganic elements.
- Extra feeding hampers reproduction in animals: more energy results in fatty animals and higher protein intake increases ammonia and urea levels in blood, which ultimately affect reproduction in males as well as females.
- Undigested nutrients, especially nitrogen and phosphorus, present in excess in dung and urine, can lead to the growth of undesirable flora in soil and water bodies and modify soil characteristics. Also, greenhouse gases are produced adding to pollution.
- Since the country has high fibrous feed materials and a vast population of livestock to feed, every kilogram of material should be properly balanced to get efficient and enhanced production.

Given these areas of concern, certain factors need to be addressed.

Green forage priority

The area under fodder production has remained at between four to five per cent of arable land for long, till recent changes in the transgangetic regions, irrigated land and in peri-urban areas have seen farmers going in for more green fodder production. In some areas, between eight to 15 per cent area is under fodder production. The adoption of berseem, multicut sorghum varieties, cowpea, maize, lucerne grass, guinea grass, para grass, hybrid napier and guar (cluster bean) have been reported from different regions.

Green forage, being rich in nitrogen, calcium, phosphorous, other trace minerals and vitamins, is palatable to dairy cattle and buffaloes. Legumes, in particular, have better quality protein, higher concentration of minerals, higher passage rate and also higher buffering capacity, which are very desirable qualities in fodder for high-producing animals. An organic matter digestibility of more than or equivalent to 65 per cent can be recommended for animals producing 3,000 to 5,000 litres of milk per year/lactation.

Green fodder supply management with greater rotation is recommended for cattle and buffalo with higher genetic potential. Semi-arid regions can go in for crops requiring less

Table1: Feeding Value in terms of crude protein (CP) and total digestible nutrients (TDN) on DM (dry matter) basis of forage and concentrate ingredients for cattle and buffalo

Name of fodder	CP	TDN	Name of feed/grain	CP	TDN
Sorghum	6.2	62.4	Sorghum	11	73
Maize	6.9	65.0	Maize	10	76
Pearl millet	6.3	59.2	Pearl millet	11	77
Teosinte	7.3	58.3	Soybean		100
Hybrid Napier	6.8	55.2	Cluster bean	38	73
Guinea grass	6.8	55.4	Mustard	21	111
Para grass	7.9	55.6	Oats	11	78
Cowpea	18.6	61.4	Wheat	12	92
Soybean	14.4	55.0	Barley	11	75
Guar (Cluster bean)	8.1	55.0	Mustard cake	35	79
Lucerne	21.5	65.8	Cotton seed	20	88
Berseem	8.2	64.9	Cotton seed cake	37	72
Mustard	4.7	65.0	Cotton seedcake (decorticated)	46	86
Oats	10.5	62.0	Soybean meal	51	82
Finger millet straw	3.2	45.1	Gram	18	81
Sorghum Stover	3.2	45.8	Peas	19	79
Pearl millet Stover	2.9	45.9	Groundnut cake	42	79
Maize Stover	3.0	53.0	Linseed meal	40	71
Wheat Straw	3.5	46.2	Wheat bran	14	71
Gram Straw	4.4	43.5	Rice bran	11	78
Oat Straw	3.2	49.5	Deoiled rice bran	12	60

Table2: BIS standards, dairy feed requirements

Characteristic	Type I (IS: 2052, 1990)	Type II (IS: 2052, 1990)
Moisture (maximum %)	11	11
Crude protein (maximum %)	22	20
Crude fat (minimum %)	3	2.5
Crude fibre (maximum %)	7	12
Acid-insoluble ash (maximum %)	3	4

Source: Bureau of Indian Standards, New Delhi, India

irrigation or rain fed crops. There is also need for support with appropriate technologies of forage conservation in the form of silage, hay and such others. These crops need to be harvested before they flower, since the onset of flowering means reduced digestibility. Crops like sorghum, pearl millet, fodder maize can be harvested even at 60 cm. Most new varieties have very low hydrogen cyanide (HCN) when irrigated and may per se result in higher intake and nutritive value for high-yielding animals. Efficient chaffing is also important but in southern, central and eastern parts of the country the chaff cutter is not used by many farmers, thereby resulting in loss of very significant quantities of forage biomass.

Improved utilisation of crop residues

Crop residues such as cereal straw, sugarcane tops are often available in plenty but not harvested/ processed or stored properly. The harvested material should be transported to store under shade and stacked properly. Left in the field, they are subject to deteriorating weather condition and consequential reduction in value through shattering of leaves (that have more feeding value than stems) and chemical changes due to decreased digestibility. The threshing of straw to appropriate particle size (3 to 6 mm) is desirable for it to be better utilised. A bigger particle size will stay longer in rumen and thereby decrease the dry matter (DM) intake by the ruminant animal, while a smaller particle may not get enough time for microbial action in the rumen. Threshers that produce appropriate size particle (chaff) need to be used.

Straw enrichment

All straw available in country – wheat, paddy, sorghum, pearl millet or *ragi* – is low in nitrogen. Urea solution application to increase the nitrogen to one per cent to 1.5 per cent by applying three kilograms of urea dissolved in 20 to 30 litres of water can be sprayed on 100 kg of straw. The sprayed and mixed straw should be stored up to two to three weeks, under a polythene sheet, to allow the microbial and chemical action, resulting in softening and swelling of particles and, consequently, in increased intake by 25 per cent and animal getting up to 30 to 40 per cent more metabolisable energy, along with additional four to six per cent of crude protein.

The treated straw can be supplemented by concentrated ingredients supplying energy, protein, minerals and Vitamin A. Molasses can serve as a source of energy, binder and sweetener to improve the palatability. The mixed ingredients could be converted into blocks/bricks by applying pressure through pressing machines and the feed block thus prepared can be fed alone or along with green forage to lactating ruminants. Small farmers can soak straw and mix with required quantities of cakes/chunnies like mustard, cotton seed, sorghum, gram, and groundnut singly or, preferably, in a mix along with mineral mixture. Supplementing green forage with such a mix enhances palatability and intake by animals.

Protein sources

For higher milk synthesis, it may be essential to get additional quantity of protein from sources as cakes, oil seeds, leguminous seeds or their by products may be essential. A cocktail of two to three ingredients results in balancing amino acids. Mustard cake is a good source of sulphur containing amino acids methionine/cystine whereas soybean provides lysine. Maize gluten is an excellent source of both of these limiting amino

Photo: Padullaparthy Srinivasulu

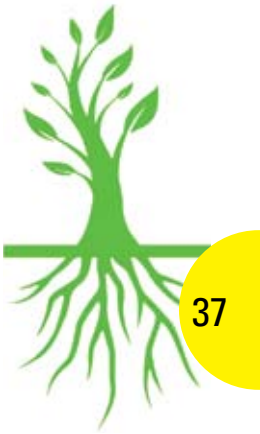
Table 3: Nutrient requirements of lactating dairy cows as determined using standard diets (NRC2001)

Item	Milk production 25 (kg)/day	Milk production 35(kg)/day
Dry matter intake (kg)	10	21.7
Daily wt change (kg)	0	- 0.2
Energy NEL (Mcal /day)	27.7	35.6
Energy NEL (Mcal /Kg)	1.54	1.64
Protein Metabolisable(g/d)	1991	2639
Diet % MP	11.1	12.2
Rumen degradable protein (g/d)	1747	2125
Diet % RDP	9.7	9.8
Rumen undegradable protein (g/d)	1151	1632
Diet % RUP	6.4	7.5
% RDP + % RUP (crude protein)b	16.1	17.3
Fibre and carbohydrate		
NDF (Neutral Detergent Fibre) min %	25-33	25-33
ADF (Acid Detergent Fibre) min %	17-21	17-21
NFC (Non Fibrous Carbohydrate) max %	36-44	36-44
Minerals		
Absorbable calcium (g/day)	50.7	65.2
Dietary Ca %	0.57	0.57
Absorbable phosphorus (g/day)	41.4	54.1
Dietary P %	0.33	0.37
Mg d%	0.18	0.19
C1 %	0.24	0.26
K %	1.02	1.03
Na %	0.2	0.2
S %	0.2	0.2
Co mg/kg	0.11	0.11
Cu mg/kg	10	10
I mg/kg	0.44	0.4
Fe mg/kg	14	16
Mn mg/kg	12	12
Se mg/kg	0.3	0.3
Zn mg/kg	45	49
Vitamin A(IU/day)	49500	49500
Vitamin D (IU/day)	13500	13500
Vitamin E (IU/day)	360	360
Vitamin A(IU/day)	2772	2300
Vitamin D (IU/day)	755	627
Vitamin E (IU/day)	20	17
Sample diets used to generate table, ingredients listed as kg/day DM		
Corn silage normal	8.96	7.77
Soybean meal, meal solv 48% CP	2.16	2.78
Legume forage silage ,mid maturity	2.67	3.1
Corn grain, steam flaked	2.6	4.91
Calcium carbonate	0.06	0.04
Monosodium phosphate (1 H20)	0.01	0.01
Sodium chloride	0.1	0.1
Grass hay c-3 mid mat	0.85	0.95
Vitamin and mineral premix	0.5	0.5
Cottonseed whole with lint	Nil	1.02
Tallow	Nil	0.24
Calcium soaps of fatty acid	Nil	0.18
Blood meal ring dried	Nil	0.11
Diet evaluation		
NEL(Mcal/kg)	1.62	1.58
Undiscounted TDN %	73	73

a. *Recommended energy content of early lactation rations must be limited to prevent rumen acidosis. The cow must, therefore, be expected to utilise body reserves to meet energy needs of highest of milk production.* ***b.*** *Equivalent to crude protein requirement only if RDP (rumen degradable protein) and RUP (rumen undegradable protein) are perfectly balanced.* ***c.*** *These are the minimum fibre (or maximum NFC) concentrations needed to maintain rumen and milk fat test.* ***d.*** *Assumes that active transport of magnesium across the rumen wall is intact. High dietary potassium and excess non-protein nitrogen often interfere with Mg absorption. Under these conditions dietary Mg should be increased to between 0.3 per cent and 0.35 per cent.* ***e.*** *Heat stress may increase the need for potassium.* ***f.*** *High dietary molybdenum, sulphur and iron can interfere with copper absorption increasing the requirement.* ***g.*** *Diet high in goitrogenic substances increases the iodine requirement.*

Table 4: Role of minerals for animals

Mineral Element	Role	Effects of Deficiency
Calcium	Bone and teeth, transmission of nerve impulses	Rickets, osteomalacia, thin eggshells, milk fever
Phosphorous	Bone and teeth, energy metabolism	Rickets, osteomalacia, depraved appetite, poor fertility
Potassium	Osmoregulation, acid-base balance, nerve and muscle excitation	Retarded growth, weakness
Sodium	Acid-base balance, osmoregulation	Dehydration, poor growth, poor production
Chlorine	Acid-base balance, osmoregulation, gastric secretion	Alkalosis
Sulphur	Structure of amino acids, vitamins and harmones, chondroitin	Equivalent to protein deficiency (urea-supplemented diets)
Magnesium	Bone, activator of enzymes for carbohydrate and lipid metabolism	Nervous irritability and convulsions, hypomagnesaemia
Iron	Haemoglobin, enzymes of electron transport chain	Anaemia
Copper	Haemoglobin synthesis, enzyme systems, pigments	Anaemia, poor growth, depigmentation of hair and wool, swayback, poor reproduction
Cobalt	Component of vitamin B_{12}	Pining (emaciation, anaemia, listlessness), poor reproduction
Iodine	Thyroid hormones	Goitre; hairless, weak or dead young
Manganese	Enzyme activation	Retarded growth, skeletal abnormality, ataxia, poor reproduction
Zinc	Enzyme component and activator	Parakeratosis, poor growth, depressed appetite, poor reproduction
Selenium	Component of glutathione peroxidase, iodine metabolism, immune function	Myopathy, exudative diathesis



acids. Synthetic lysine and methionine are available and can be beneficial for feeding animals yielding more than 15 litres of milk per day. Choline can also be beneficially tried on animals being fed lower quantities of poor quality protein in respect of limiting amino acid (methionine).

Energy sources

Carbohydrates, specifically structural carbohydrates are natural energy source for ruminants. Cellulose, hemicelluloses proteins and other cell wall constituents are digested in rumen with the help of bacteria, protozoa and fungi inhabiting the rumen. Starch sources are also required when the productivity of the animal is high but higher quantity can reduce the rumen pH below 4.2 and thus depressing the action of cellulolytic microbes. Non-fibrous carbohydrates should account for no more than 40 per cent in a ration as the higher concentration can lead to poor fibre digestion and laminitis (hoof wounds). The use of buffer can be resorted to in early lactating when excess of carbohydrates is used for animal feeding. Fats, if fed more than five per cent of DM intake, may adversely affect rumen micro flora. Bypass fats or proteins can be supplied to high-yielding animals when they are available at reasonable rates. Crushed mustard seeds/soybean seeds may be more economical than bypass nutrients and may supply sufficient energy and proteins.

Micronutrients

Minerals and vitamins are essential ingredients of a balanced ration. Out of the 15 or more minerals, the major ones are calcium, phosphorous, sodium, potassium, chlorine, and magnesium, of which more than 100 mg per kilogram of diet is required. Even less than 100 mg/kg/diets of zinc, copper, iron, manganese, iodine, selenium molybdenum and fluorine are required but their deficiency can result in poor reproduction, immunity and health problem in animals. Area specific mineral mixtures are currently being proposed. The composition and requirement of minerals are given in *Table 5* as recommended by BIS (IS 1664:2002) for mineral mixtures.

Vitamin A is essential in the ration and can be supplied by even two kilograms of green fodder per day. Vitamin D in skin and other B complex are synthesized in the rumen. Supplementation of nicotinic acid, choline and biotin are sometimes useful to high producing animals. Water requirement varies with season and good quality and adequate water should be made available to animals.

Table 5: Composition of minerals mixtures as recommended by BIS (IS 1664:2002)

S. No.	Characteristics	Requirement	
1	2	Type 1	Type 2
1.	Moisture, per cent by mass, maximum	5	5
2.	Calcium, per cent by mass, minimum	16	20
3.	Phosphorous, per cent by mass, minimum	9	12
4.	Salt (chlorine as sodium chloride), per cent by mass, minimum	22	Nil
5.	Magnesium, per cent by mass	4	5
6.	Iron, per cent by mass, minimum	0.3	0.4
7.	Iodine (as kI), per cent by mass, minimum	0.02	0.026
8.	Copper, per cent by mass, minimum	0.078	0.100
9.	Manganese, per cent by mass, minimum	0.1	0.12
10.	Cobalt, per cent by mass, minimum	0.009	0.012
11.	Fluorine, per cent by mass, maximum	0.05	0.07
12.	Zinc, per cent by mass, minimum	0.64	0.80
13.	Acid – insoluble ash, per cent by mass, maximum	2.4	3.0
14.	Sulphur, per cent by mass, minimum	1.4-2.3	1.8-3.0
15.	Lead mg/kg maximum	16	20
16.	Arsenic (Arsenic trioxide)mg/kg maximum	5	7
17.	Total Ash (%) on DM basis	81-88	78-85

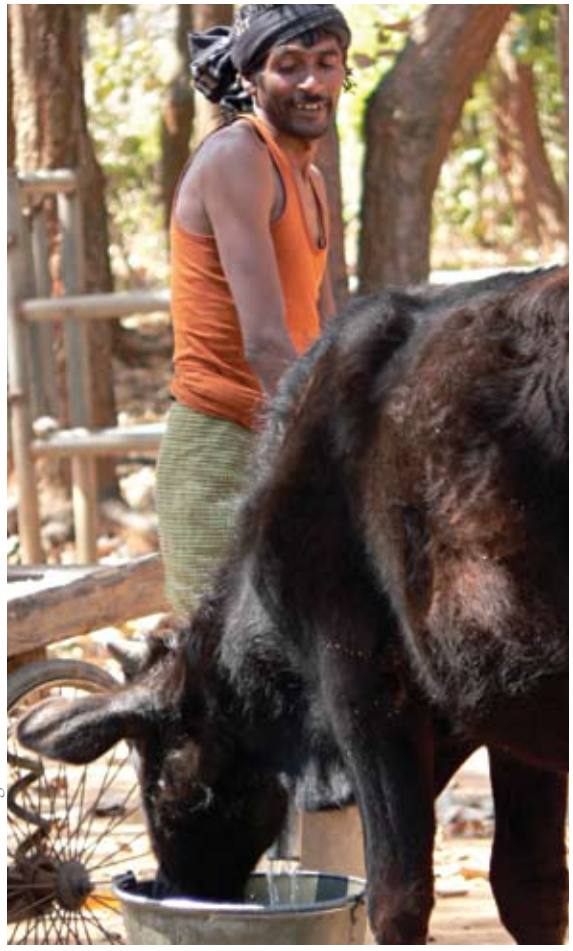


Photo: Prema Sagar

The feed industry supplies less than 10 million tonnes of compound feed against a requirement of more than 50 million tonnes, which means a huge deficit. There is urgent need for policy to control export of cakes from the country while liberalising imports of synthetic amino acid. Making molasses and urea available at reasonable rates could help in reducing feed cost.

There are some simple and scientific practices that can help:

- Research on fodder for seed production to produce legumes as cowpea straight varieties and also those that can withstand excess rain.
- A field straw block-making machine, which can treat straw and convert it into bail/block in the farmers' field, appears to be a logical need than huge capacity machines.
- Promoting chaff cutters suitable for south India.
- Controlled grazing in grazing lands, reseeding, fodder tree planting, bunding and such others can add to biomass production significantly in rain fed areas.
- Popularisation of silage, hay and straw processing technologies, involving industry
- Popularisation of mineral supplementation to lactating animals at a reasonable price.
- Appropriate feed management during hot and humid months to alleviate summer stress and increase the productivity of animals.
- Balancing ration feeding to increase the production and productivity of animals and reduce methane production.
- Joint research programmes with private organisations to produce seeds of multicut varieties of sorghum, pearl millet and high straw biomass of important nutritional characteristics production from cereal and crops.
- Developing precise database on feed and forage availability along with nutrient requirements. ●

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COVER STORY

Photo: Rob Waterhouse

CROSSBREEDING CATTLE

A Matter for Caution

Dr O.P. Dhanda and Prof. K.M.L. Pathak

European missionaries started crossbreeding of cattle in India in 1875 when the 'Taylor Breed' of cattle was developed around Patna, Bihar, breeding Shorthorn bulls with native cows. European planters started crossbreeding native cows with Ayrshire, Friesian and Jersey in the Nilgiri district of the then Madras state about one and a quarter century back.

- The crossbreeding programme started at the Imperial Dairy Research Institute, Bangalore in 1910, involving Ayrshire bulls and Haryana cows. The experiment was expanded to Sahiwal in 1913 and Red Sindhi in 1917.
- In 1938, crossbreeding of Red Sindhi with Holstein Friesian was started.
- The Agriculture Institute, Naini, Allahabad started a crossbreeding programme in 1924 with four exotic breeds namely Holstein Friesian, Brown Swiss, Guernsey and Jersey.
- Many bilateral projects started at different locations in the country during the 1960s. They were: the Indo-Danish Project at Hesserghata (Karnataka) in 1961, the Indo-Swiss Project in Kerala in 1963 and the Indo-German project at Mandi (Himachal Pradesh) and Almora (Uttarakhand) in 1963.

Systematic research programmes for enhancing milk production through crossbreeding of European and Indian breeds of cattle was started in India with a project on 'Behaviour Patterns of Zebu Crossbreds with Exotic Dairy Breeds', initiated by the ICAR during 1968 at IVRI, Izatnagar and HAU, Hissar. It involved crossbreeding of Haryana with Holstein Friesian, Brown Swiss and Jersey. The project involved four more stations namely Rahuri (Maharashtra), Jabalpur (Madhya Pradesh), Lam (Andhra Pradesh) and Dharwar (Karnataka). The original mating plan was to produce four types of crossbreds from each of three exotic breeds – F1, ¾ breds produced through breeding F1 females with the same or other exotic breed, backcross to paternal breed, F2 by inter se mating of F1 and three breed crosses by mating males and females from two different F1 crosses in all six possible combinations.

As a result of these efforts, India occupies the first position globally with its annual milk production of 110 million tonnes with an increment of four per cent. According to an estimate, India's milk production would be 170 million tonnes by 2020. India has 199.1 million cattle, as per the 18th Livestock Census, of which there are 72.7 million breedable females (including 16.1 million crossbreds). There are 33.1 million crossbred cattle, of which 16.1 millions are breedable females. About 72.7 million cows produce 44 million tonnes of milk (40 per cent of total 110 million tonnes). Out of 40 per cent of total milk produced by cows, 21 per cent is produced by indigenous cows (56.6 million breedable cows) and 19 per cent by crossbred cows (16.1 million breedable cows). It is obvious that about 22.1 per cent of breedable crossbred cattle are producing nearly 48 per cent of total cow milk.

Yet, the increase in milk production is far below the expectation and not in consonance with the quantum of money, efforts and other resources employed in reaching the current production level. Therefore, there is a strong need to review the present status of crossbreeding of Indian cattle breeds with exotic germplasm so as to take suitable measures in realising the objective of enhancing milk productivity.

Crossbreeding at experimental farms

The results of crossbreeding experiments have been analysed and discussed mostly in relation to relative superiority of exotic breeds used, optimum level of exotic inheritance and effects of interbreeding among crossbreds. E. P. Cunningham and O. Syrstad, in 1987, in a paper for the Food & Agricultural Organisation reviewed the optimum use of *Bos taurus* and *Bos indicus* cattle for milk production in the tropics. They combined many field reports into a single weighted least-squares analysis across experiments, with animals classified according to the proportion of *Bos taurus* genes they possessed. It was revealed that the least square mean performance improves linearly for all traits up to 50 per cent *Bos taurus* inheritance (F1). As the proportion of *Bos taurus* genes increased, an increased calving interval was observed, while no clear trend was seen in the other traits such as milk yield, lactation length and age at first calving.

Table 1: Bovine traits

Exotic inheritance	AFC	MY	CI
0	43.6±0.6	1052±39	459±5
1/8	40.1±2.8	1371±170	450±21
1/4	37.5±2.9	1310±158	435±23
3/8	36.1±1.4	1553±100	435±12
½ (F1)	32.4±0.5	2039±28	429±4
5/8	33.8±1.1	1984±75	432±9
¾	33.9±0.7	2091±45	450±6
7/8	34.4±1.2	2086±84	459±11
1	31.6±0.9	2162±50	460±7

Synthesis of crossbred strains

The synthetic crossbred strains developed in India are Karan Swiss and Karan Fries at National Dairy Research Institute (NDRI), Karnal; Frieswal at Military Dairy Farms and Sunandini, under field conditions of Kerala. The production and reproduction performance of synthetic crossbred cattle strains in different generations are given in Tables 1, 2 and 3 respectively.

The results suggested that crossbreds with exotic inheritance between 50 to 62.5 per cent were suitable in most environments and gave two to three times more yield than indigenous cattle breeds. Holstein halfbreds outperformed other breed crosses. Barring a few cases, higher crosses showed no advantage over the halfbreds. In general, two-breed crosses exhibited higher performance than the three-breed crosses. Large variation in performance of crossbreds in different regions was due to indigenous and exotic breeds used, levels of exotic inheritance, availability of inputs and the climatic conditions. Further, Holstein-Friesian has been found to be the breed of choice for crossbreeding with local cattle in agro-ecological areas where quality feed and fodder resources are adequate to sustain the crossbred cattle and Jersey have been found to be the breed of choice

Table 1: Production and reproduction performance of synthetic crossbred cattle strains

Strain	Age at first calving (months)	Total lactation milk yield (kg)	Lactation length (days)	Calving interval (days)
Karan Swiss	34.6	3075	326	412
Karan Fries	32.6	3686	321	401
Sunandini (Farm-bred)	30.5	2901*	-	410
Sunandini (Field)	39.01	2487*	-	-
Frieswal	31.9	2971	317	426

**305-day milk yield*

Source: Gandhi and Singh, (2004) and Kerala Livestock Development Board (KLDB) Annual Report, 2001-02

Table 2: Average first lactation milk yield in F1 and F2 generations of crossbreds

Genetic group	F1	F2	% decline
BS	2898	2183	24.67
BS	3548	2805	20.94
JH	1679	1328	20.91
JR	1929	1115	42.20
FH	1933	1349	30.21
FG	3391	2533	25.30
JK	2547	2031	20.26
FH	1926	1293	32.87
JH	1610	1139	29.25
KS (B x S)	3247	2380	26.70
KF (F x T)	3747	3105	17.13

F: Friesian, B: Brown Swiss, J: Jersey, S: Sahiwal, H: Hariana, O: Ongole, K: Kankrej, R: Red Sindhi, G: Gir

Table 3: Least squares means of F1 (three breed) F2 and F3 crossbred cows and estimates of heterosis calculated from F1 and F2 of three breed crosses

Traits	F1 (Three breed)	F2 (Three breed)	F3 (F1 x F2-Three breed)	Heterosis (%)
12-months body weight (kgs)	174.3±2.2	159.8±2.7	167.3±3.9	13.3
18-months body weight (kgs)	254.7±2.5	245.0±3.0	235.1±4.4	6.1
Weight at first calving (kgs)	350.2±3.6	342.9±4.4	337.8±6.0	3.4
Age at first calving (months)	31.2±0.4	33.3±0.5	32.6±0.7	10.7
First lactation. Complete milk yield (kgs)	3204.8±95.9	2659.4±118.5	2921.161.7	27.2
First Lactation: 305-days milk yield (kgs)	2709.1±62.6	2306.9±76.9	2493.5±104.9	23.7
First lactation length (days)	9383.8±9.0	362.1±11.1	364.8±15.1	9.0

Source: Singh et al., (2001)


Photo: Peter Hottmeling

Table 4: Progeny testing of Sahiwal cattle

Set No.	Duration	Centre-wise no of bulls				Average Dam yield
		Karnal	Lucknow	Durg	Total	
1	1979-82	-	3	3	6	3223
2	1982-86	-	4	4	8	3558
3	1987-91	3	4	1	8	3073
4	1992-96	3	2	6	11	2836
5	1996-99	5			5	3256
6	1999-02	6			6	3649
7	2002-04	4			4	3404
8	2004-05	7			7	3722

in hilly areas where size of the breed required is small and feed and fodder supply is limited.

No doubt crossbreeding has contributed towards milk production in India but has also led to:

- Erosion of indigenous genetic sources.
- Ingression of many infectious diseases of temperate region, which were not prevalent in tropical countries like Infectious Bovine Rhinotracheitis (IBR) and Blue Tongue.
- Higher susceptibility of crossbred to diseases prevalent in tropical environment like Foot and Mouth Disease, mastitis and tick borne diseases.
- Higher incidences of reproductive disorders like anoestrous and repeat breeding in crossbred cattle. Poor sex libido and lower freezability of semen of crossbred bulls leading to very high culling rate in bulls.
- Higher cost of maintenance and sustenance vis-à-vis feeding management and veterinary services.
- Disposal of crossbred male calves.

Indigenous breeds

India has some very good milch breeds like Sahiwal, Gir, Sindhi, Tharparkar and Rathi. These breeds have been developed through selective breeding over centuries in hot and hot-humid climate and are known for their endurance to heat and disease resistance and thrive on poor quality roughages and fodders. The performance of Sahiwal animals (*see above*) bred on scientific lines is equally impressive in production. This is illustrated from the data collected over a period of 20-25 years during progeny testing programme of this breed undertaken at different stations.

Crossbreeding has contributed towards enhanced milk production in the country and the way forward should be guided by the following recommendations:

- Recognised breeds of Indian cattle especially milch breeds should be left out of crossbreeding programmes to be improved through selective breeding only. These breeds should be used to upgrade local cattle in areas having low availability of feed, fodder and other resources.
- Crossbreeding should be implemented only in potential areas having availability of quality feeds at relatively low prices, demand for cow milk, low demand for draught animals and accessibility to veterinary faculties.
- Non descript or low producing animals should be bred through crossbreeding. ●

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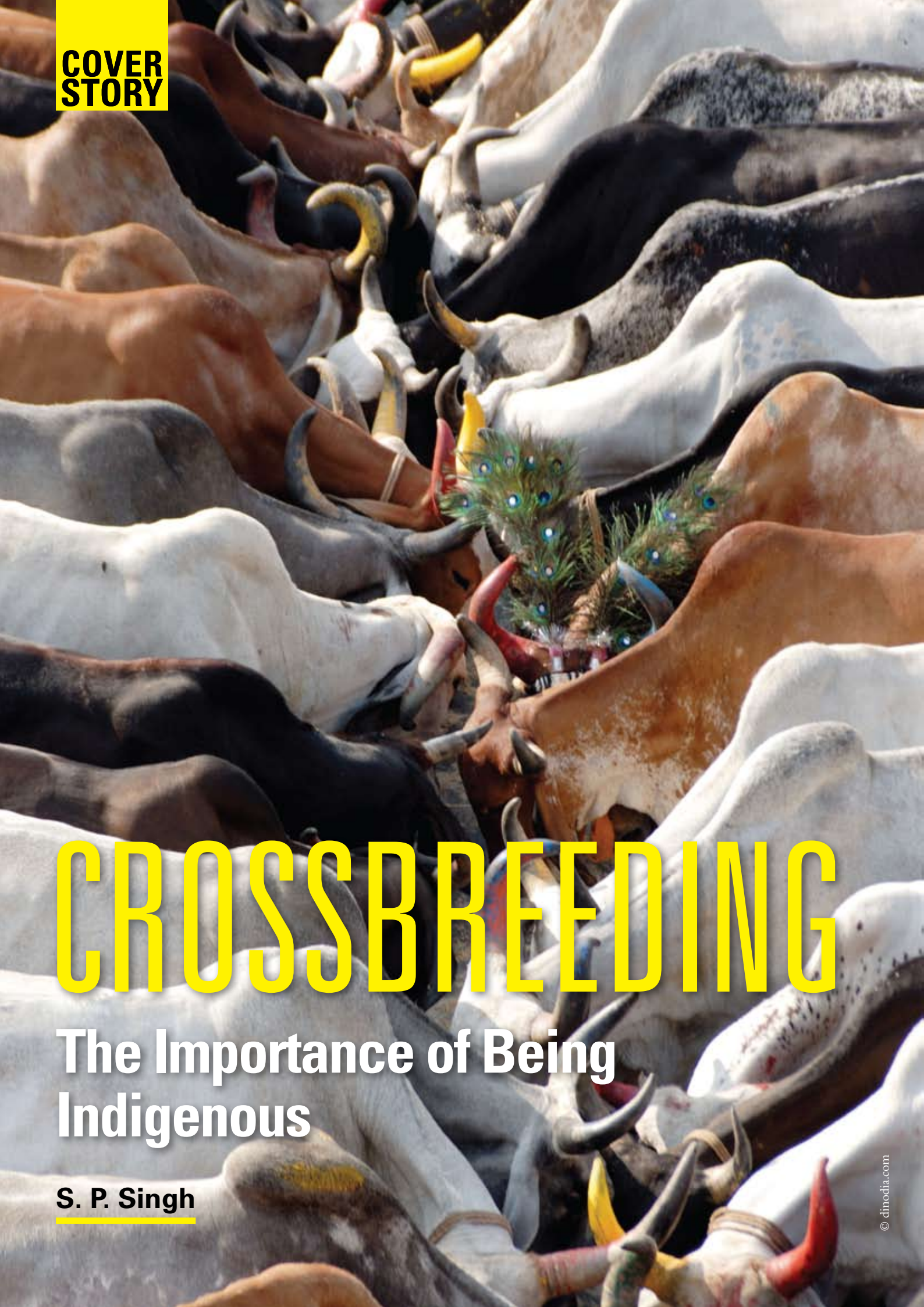
COVER STORY



CROSSBREEDING

The Importance of Being Indigenous

S. P. Singh

Of India's estimated milk production of around 109 million tonnes, nearly 40 per cent is contributed by dairy cows. The remaining (60 per cent) comes from buffaloes and other species. There is little doubt that crossbred cows have a major share in this feat but the role of indigenous and nondescript cows cannot be ignored. Crossbreeding was introduced in the country more than half a century ago to quickly enhance milk production. The basic idea was to utilise the higher milk yield trait of exotic breeds and heat tolerance and disease resistance capacity of the indigenous breeds. The idea was excellent but it needed a distant fine-tuning of breeding policy to sustain milk production for a long time and not to lose India's precious indigenous germ plasm.

A quick survey of today's scenario vis-à-vis the status of crossbreds in rural India suggests that not all aspects pertaining to implications of crossbreeding have been taken care of. The unplanned and uncontrolled breeding policy, devoid of statutory regulations, has proved to be disastrous in several ways. Not only have we nearly lost many elite, indigenous breeds, the heterogeneous cattle population in rural India that is unfit for future evaluation, selection and improvement. In spite of a clear breeding policy in place right from the beginning, unchecked and unrestrained crossbreeding has been going on even in the home tract of famous indigenous breeds, resulting in the dilution of precious germplasm, extinction of elite breeds and the production of crossbred population of unknown genetic make up. Also, unprotected import and lack of regulatory policy is responsible for new and unknown or unheard of diseases in our livestock population. One such dreaded disease is infectious bovine rhinotracheitis (IBR), which has affected both the bulls and cows in India.

Where did we falter?

The cattle breeding policy has been explicit right from the beginning but it was not implemented under prescribed regulations. As early as 1965, the scientific panel on Animal Husbandry of the Union Ministry of Agriculture clearly laid down the breeding policy for cattle. It had three main elements:

a. Selective breeding amongst the cows of indigenous breeds,
b. Grading up of nondescript cattle with established elite breeds, and/or
c. If optimum inputs were available, crossbreeding of the nondescript cows with exotic dairy breeds.

The question of introducing crossbreeding on a large scale was examined at several levels but no one favoured it without proper checks and balances. In fact, most early experts like Norman C. Wright (1937) and Colonel A. Oliver (1938) warned against embarking on large-scale crossbreeding. Even the Royal Commission on Agriculture (RCA) did not approve the experiments in crossbreeding. Systematic crossbreeding seems to have begun in the country in 1959, when an expert committee set up by the Government of India recommended the breeding of nondescript cattle with exotic breeds to increase milk production as quickly as possible (National Commission on Agriculture, NCA 1976).

The cattle breeding policy was again reviewed in 1965 by the scientific panel on animal husbandry that suggested the grading up of nondescript cattle with superior indigenous breeds and also with exotic dairy breeds with bulk of exotic inheritance from Jersey (Amble and Jain, 1966). This was followed in 1968 by a large scale-crossbreeding programme – All India Coordinated Research Project (AICRP) – approved by the Indian Council of Agricultural Research (ICAR).

It would appear that India faltered not because of a faulty breeding policy but because of faulty implementation. Some observations are as under:

- Did not devise a regional micro level breeding policy as recommended by NCA from the beginning.
- Did not adhere to the basic elements of restricting crossbreeding of exotic dairy breeds only with nondescript cattle.
- Did not enact statutory legislation or set up a regulatory authority that would have prevented indiscriminate breeding even in the home tract of

Photo: Jet Steverink

elite indigenous breeds resulting in their extinction.

- Did not adhere to the NCA's recommendation to obtain bulk of the exotic inheritance through the Jersey breed. The commission had recommended that Holstein Friesian (HF) be restricted in milk-shed area with availability of high grade inputs.
- Did not foresee the issues that would emerge due to the introduction of exotic germplasm/breeds adapted to the high-input system nor how they would perform in low-input environment.
- Did not foresee and take preventive measures for the possible transfer of new disease to our livestock population such as IBR and Blue Tongue that came into India through imported semen/animals.
- Did not take into consideration the severe feed/fodder resource limitation in the country. Even now, according to one estimate, the country is deficient by 45 per cent concentrate and 31 per cent dry fodder (Kurup, 2000).
- Did not ensure availability of progeny-tested bulls that were required to maintain the desired inheritance level in crossbred cows.
- Allowed crossbreeding of exotic breeds with elite indigenous dairy breeds like Sahiwal, Gir, Tharparkar, Red Sindhi and Rathi with a view to synthesising a new cattle strain for the tropical climate of India. The synthesised strains have not been promising and the efforts to produce suitable crossbred are yet to be successful. Worse, in this fruitless effort, we are almost at the edge of losing our prized indigenous dairy breeds.

Village level problems with crossbreds

The performance of crossbreds at the organised farms and institutional herds, where optimum inputs and health care are available is good; not so under village conditions. Most published reports speak of problems of performance and health in crossbreds compared to the indigenous cows. Singh and Yadav (1999) and Singh and Ali (2004) who surveyed the performance in the western plain zone of Uttar Pradesh found the overall performance of Sahiwal to be best under field conditions. Two Sahiwal cows produced as much as 15 litres and 16 litres of milk a day, which was higher than the crossbreds. Among the crossbreds, Jersey crosses had higher milk yield and fewer incidences of reproductive disorders compared to HF crosses. The maximum mortality was recorded in HF crosses (31 per cent) followed by Jersey crosses (28.3 per cent) and Desi cows (five per cent). Balaine and Taneja (1995) and Vij et al (1994), Malhotra and Parmar (2007) similarly reported higher mortality in crossbreds in Kerala and Rajasthan respectively.

The two most alarming problems of crossbreds in the field are reproductive disorders and susceptibility to such diseases as Foot and Mouth (FMD), IBR and Brucellosis. IBR entered in to India through import of semen/dairy animals from western countries and played havoc with our cattle and buffalo population. The table below gives the sero-prevalence data of animals affected by this dreaded disease.

Singh and Yadav (1998) observed that the extent of reproductive problems could be gauged by the fact that buffaloes were replacing crossbred cows resulting in a cow, buffalo ratio of 1:9 in villages. More than 80 per cent of farmers rearing buffaloes and more than 60 per cent rearing cows had preferred natural service to artificial insemination (AI), due to low conception rate through AI. Other major problems were mastitis, hoof disorders, laminitis and pendulous udder, especially in HF crosses.

Amongst the reproductive disorders anestrum, subestrum, repeatability, infertility, endometritis, salpingitis and delayed post-partum heat were common (Pandey et al, 1994; Iyer et al, 1992, Venkatasubramanian and Rao, 1993) reported that the incidence and severity of disorders were more in higher crosses, older animals and in early lactation. The incidence of cystic ovarian diseases was most common in high yielders (Dutta et al 2001).

Table 1. Sero-prevalence of IBR at different locations in India

Year	Place	Positive for IBR antibodies (%)	Reference
1985	11 animal farms in 5 states	30.4	Singh et al. 1985
1996	Tamil Nadu	95	Renukaradhya et al. 1996
2000	Organised breeding bull station in U.P.	Crossbred: 54.38 Indigenous (Sahiwal): 37.5	Pandey et al. 2000
2002	West Bengal	40.8	Bakshi et al. 2002
2004-05	CADRAD, IVRI Izatnagar	45.45	Annual Report CADRAD
2005	Semen freezing stations of U.P.	50 - 68.8	Pandey 2005
2005	Semen banks of northern India	41.4	Kaushal et al. 2005
2006	Hill cattle of Himachal Pradesh	20	Sharma et al. 2006
2007	Karnataka	60	Koppad et al. 2007

Source: Summarised from various reports

Most early experts had cautioned against large-scale crossbreeding. The answer to sustainable milk production lies switching to our elite indigenous breeds

Power of the indigenous breeds

Most early experts and the RCA had cautioned against the adoption of large-scale crossbreeding and the current mess reflects alarming problems in the crossbred cattle population. The inability to sustain their milk production level and the loss of germplasm of prized indigenous breeds prove that they had a point. It has also been realised that the answer to sustainable milk production lies in switching to our elite indigenous breeds.

The unique qualities of indigenous cattle (*Bos indicus*/Zebu/Brahaman) have long been known and documented (Cartwright, 1955; Allen, 1962; Johnson, 1963; Howes, 1963 Bonsma, 1973; Turner, 1979, Venkatasubramanian and Fulzele, 1996). These are:

- Indian cattle have distinctive anatomical features that make them more adaptable to tropical climate. These include long legs, long ears and a hump, which increases the surface area to lose heat from. The coat is smooth and reflecting with better-developed sweat and sebaceous glands.
- They are more heat tolerant and lose more moisture by evaporation, have lower respiration at all levels of skin temperature and during extreme heart load. Whereas crossbred cows perform better at low environmental temperature, the milk production of indigenous cows does not decline even at 38^0C-40^0C temperatures. Where a crossbred cow started panting and was uncomfortable, indigenous cows like Sahiwal, Gir and Tharparkar hardly showed any stress and did not stop eating or grazing.
- They are reported to have higher red blood cell counts, total cell volume compared to European cattle (*Bos taurus*). The venous blood of Indian cattle had less carbon dioxide, enabling them to maintain lower respiration rate in the face of extreme heat. Lower levels of thyroid, adrenal and ovarian activity are cited as factors contributing to *Bos indicus* greater heat tolerance but lower reproductive efficiency.
- Indian cattle are well known to be more resistant to ticks, parasites, worms and pests and other common diseases (Frisch and Vercoe, 1978, Venkatasubramanian, V. and Fulzele, R.M., 1996). They were found to be more tolerant to mosquito attack, compared to Hereford cattle on the basis of weight gains. Field reports specifically directed to comparative resistance of indigenous versus crossbreds are very rare but data for some diseases is available. In another study, Pandey et al, 2000 reported genetic superiority of indigenous breeds over crossbreds pertaining to IBR infection as incidence of the disease was very low in indigenous cows compared to crossbreds. Similarly, lower prevalence of reproductive disorders was reported in native Tharparkar cows (37 per cent) compared to crossbreds (45.3 per cent) in the Jabalpur area (Pandey et al, 1994). In Kerala, Iyer et al, 1992 found higher incidence of ovulatory disturbances

Photo: Barun Patro

None of the so-called evolved strains could establish themselves as an alternative to the recognised breeds. Synthesised crossbreeds are not sustainable

in crossbreds than indigenous cows.

- Another adaptive attribute of *Bos indicus* is its ability to survive and maintain itself on poor quality forages and restrictive environment. Experts have attributed this quality to a genetic ability to utilise forages more efficiently. *Bos indicus* was found to utilise low-energy diets (high roughages) more efficiently whereas Hereford cows were observed to be superior to Indian cattle on a high-energy diet (Moore et al, 1975).
- Behaviourally, Zebu cattle are docile and quiet but get aroused more quickly than European cattle.
- Recent researches have shown that *Bos indicus* cows are the potential source of BCM 7 free A2 milk (Beta Casomorphine 7), which is considered good milk as against the *Bos taurus* cows, which produce A1 milk. The A2 milk is in great demand all over Australia and Europe, reflecting the high quality milk produced by the native Indian cattle.
- The fat percentage in milk of Indian elite breeds like Sahiwal is significantly higher (four to five per cent) than in the crossbred cows (3.5 to 4 per cent) although the solid not fat percentage (SNF) is variable. Higher fat content in the milk of Indian cows is a very positive and likable trait.

In spite of proven qualities of indigenous dairy breeds, they did not find a priority role in breeding schemes or their role was mismanaged. A few disastrous programmes, like an attempt to synthesise new cattle strain involving elite indigenous breeds were encouraged without considering the long-term consequences. Most of these have ended as a failure even after half a century of crossbreeding. It could be stated without hesitation that none of the so-called evolved strains could establish themselves as alternatives to the recognised breeds. In fact, the synthesised crossbreds have not been sustainable at all. All such strains starting from Taylor (in 1875), Jersind (in 1953), Brownsindh (in 1955), Sunandini (in 1964), Karan Fries (in 1971, 1980) to Karan Swiss (in 1980, 1983) have not achieved desired success. Work on Frieswal strain (from 1987) is still continuing and it would be interesting to see if it would turn into sustainable genotype. Most of


Photo: Peter Hemmeling

these strains had shown promising milk production only at organised farms but none in the village environment. Even the number of famous strains like Karan Fries and Karan Swiss started with drum-beating at premier institutions like the National Dairy Research Institute (NDRI), Karnal, have been dwindling and are now negligible (few thousands) with no takers for these animals.

Superior crossbreds

If we consider the milk production scenario, there is no doubt that the crossbreds are far superior to nondescript cows. Among crossbred, F1 cows may even be slightly better than the production performance of defined breeds but there is considerable decline in the production of the F2 and subsequent generations. Even after nearly 50 years of crossbreeding operations, the milk yield of crossbreds under field conditions has not gone beyond 2,000 to 2,500 kg and, at organised farms with the best management conditions, beyond 2,500 to 3,400 kg. There is no hope that this stagnated performance would improve.

The milk yields of our elite indigenous cows like Sahiwal, Gir and Tharparkar almost match the production performance of most crossbred cows under optimum management conditions. If a micro-economics of milk production of the best crossbred cow were to be seriously worked out, it would surely be in favour of the prized indigenous cows. A substantial budget of the dairy farm is spent in management inputs for crossbred cows; on health and disease control and feeding, which is much higher than on indigenous cows.

Poor health services

An important impediment in the successful running of a dairy business, especially at the village level, has been substandard AI and veterinary services. Inferior semen production by crossbred bulls and lack of progeny-tested bulls have rung the death knell of the crossbreeding programme. It is, therefore, absolutely essential to ensure quality semen available in time.

It is apparent that promoting elite indigenous cow breeds for dairying is the answer to sustainable milk production in the country. This needs a policy shift by switching to selective breeding among the elite indigenous breeds and grading up the nondescript cow population with established elite breeds to stabilise the productive population of these animals. Suitable legislation needs to be enacted to stop rampant breeding and to implement the changed breeding policy. It should declare the following acts on the part of animal keepers illegal.

- Keeping or rearing any breeding bull/male calf that does not belong to the breed recognised/ approved for that particular home tract.
- Using bull semen other than those approved for a particular indigenous breed/crossbreed in the area/home tract.
- Keeping or rearing any breeding bull/male calf that has not been tested for communicable/ transmissible disease by the competent authority and when the owner does not possess the fitness health certificate to this effect.
- Persons/organisations interested in crossbreeding of any kind in the home tract of an indigenous breed can do so only after getting permission of the competent authority (Department of Animal Husbandry).
- Persons/organisation violating the laws should be punished with fine and imprisonment. ●

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देश में सुशासन की नयी परिभाषा

मध्यप्रदेश का लोक सेवा प्रदान की गारंटी का कानून

|| प्रजा सुखे सुखं राज्ञः प्रजानां च हिते हितम्
नात्मप्रियं हित राज्ञः प्रजानां तु प्रियं हितम् ||

(अपने नागरिकों की खुशी में ही उसकी खुशी है, लोगों के कल्याण में ही उसका कल्याण। जो कुछ भी उसे संतुष्ट करता है उसे वह अच्छा नहीं मानेगा लेकिन जो कुछ उसके लोगों को संतुष्ट करे, उसे ही वह श्रेष्ठ मानेगा।)

(कौटिल्य रचित अर्थशास्त्र में कल्याणकारी राज्य की धारणा)

शिवराज सिंह चौहान
मुख्यमंत्री, मध्यप्रदेश

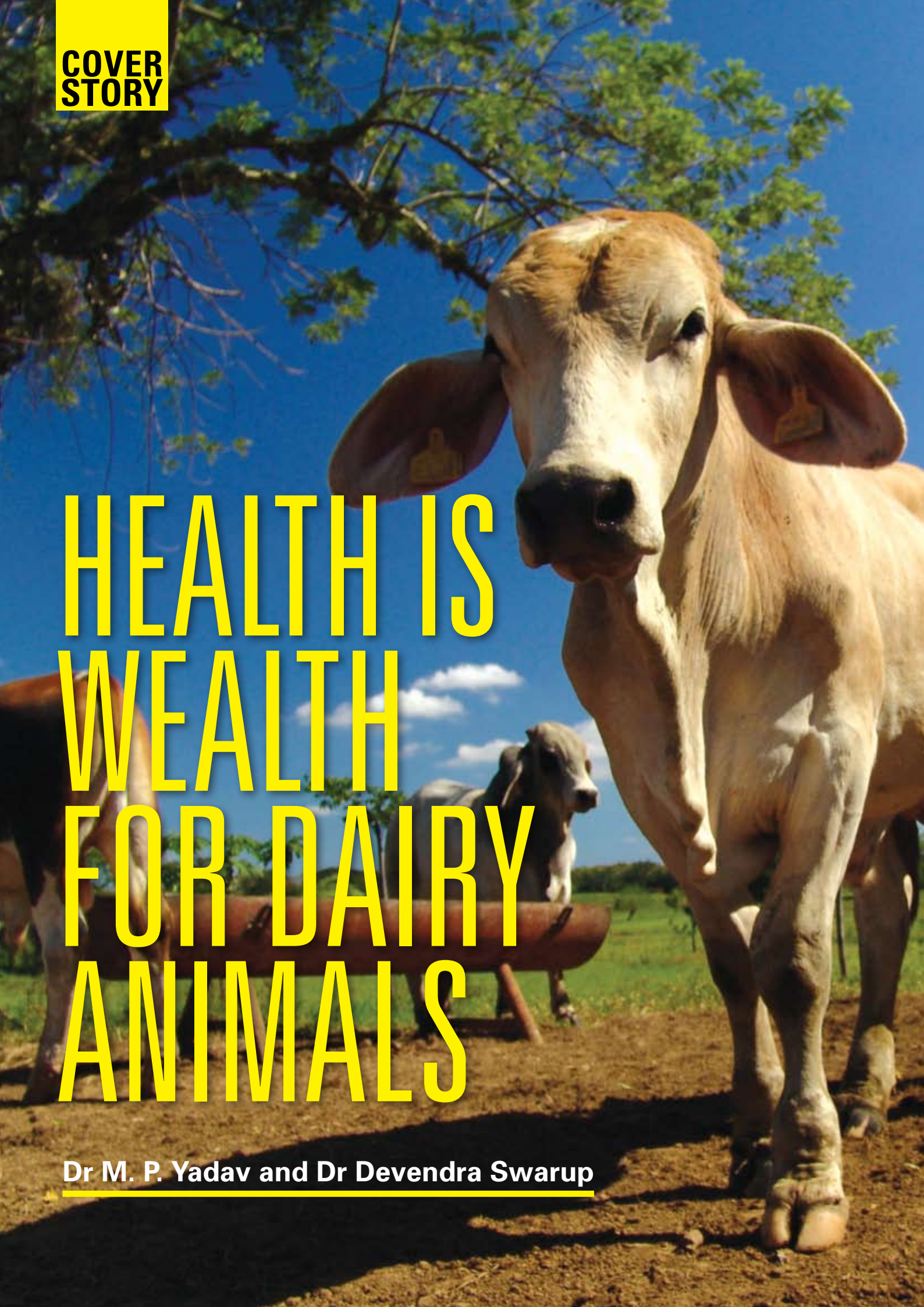
- राज्य की विधानसभा ने इसी मानसून सत्र में सर्वसम्मति से पारित किया मध्यप्रदेश लोक सेवाओं के प्रदान की गारंटी विधेयक 2010. जनाधिकार को मान्यता देते हुये सुराज के पथ पर देश के किसी राज्य में पहली बार उठा यह अभिनव कदम।
- लोक प्रशासन में प्रारंभिक रूप से चिंहित 25 सेवाओं जैसे आय, जाति, स्थायी निवासी के प्रमाण पत्र, खसरे-खतौनी की नकल, राशन कार्ड, बिजली और नल के नए कनेक्शन, सामाजिक सुरक्षा पेंशन और इसी प्रकार की अन्य सेवाओं की समय सीमा की जवाबदेही।
- सेवा प्रदान करने में चूक या देरी करने वाले कर्मचारियों या अधिकारियों के खिलाफ अपील करने का प्रावधान। अपील मान्य होने पर 5 हजार रुपये तक का जुर्माना। जुर्माने की राशि संबंधित नागरिक को।
- सुराज की धारणा को नई ऊंचाई देने वाले इस कानून को लागू करने के लिये नये लोक सेवा प्रबंधन विभाग का गठन।

जनाधिकार में जनता के साथ, ***मध्यप्रदेश सरकार***

मध्यप्रदेश जनसम्पर्क द्वारा जारी

जनसंपर्क : म.प्र. शासन/2010

COVER STORY



HEALTH IS WEALTH FOR DAIRY ANIMALS

Dr M. P. Yadav and Dr Devendra Swarup

Photo: Darias Martin

Dairying in India is both a rich man's occupation and the poor's. It provides subsistence to millions in the economically weaker sections of society including marginal, small-holding farmers and landless labourers. In economic terms, the projected size of the industry by 2011 is Rs 520,780 crore: Rs 159,600 crore from liquid milk, Rs 42,680 crore from *ghee*, Rs 50,500 crore from *khoa, chhana*, *paneer* (cottage cheese), Rs 9,100 crore from milk powder, Rs 2,250 crore from table butter, Rs 6,150 crore from cheese/edible casein and Rs 25,050 crore from other products (*Dairy India 2007,* Sixth edition).

Rearing of animals for milk and milk products dates back to antiquity. In India, cows and buffaloes are the main dairy animals though some breeds of goats like Jamunapari and Beetels are also reared for milk production by marginal farmers and the landless poor in certain parts of the country. India owns 57 per cent of the world's buffalo population and 16 per cent of cattle population and is the highest milk producing country (112 million tonnes annually) in the world. It contributes to nearly 13 per cent of the world's milk production.

However, milk production per animal and per capita availability of milk in India still remains low. Productive and reproductive performance of dairy animals in India is largely affected by inadequate dietary management and health coverage against existing and emerging diseases. Infectious diseases in dairy animals are the most serious problem causing huge financial losses to dairy farmers. Therefore, it is very important that the farmers should have basic knowledge and skill based training on important aspects of healthcare of dairy animals such as identification of sick animals and first aid treatment, mastitis control, vaccination, deworming schedule, sources of common infections and their symptoms, uses of disinfectants and hygienic practices, isolation of sick animals and quarantine and such others. Health management of animals involves three vital aspects: identification of sick animal and diagnosis of the disease, curative and supportive treatment, control and prophylaxis. Effective healthcare of dairy animals demands collaborative approaches both from farmers and the veterinarian.

Identification of sick animals

Early and correct diagnosis is the crucial component of successful health management. Diagnosis helps in recommending specific treatment and cost-effective control and prevention of disease. Identification of the sick animal is an initial step in making a diagnosis, which does not always warrant the services of a trained veterinary doctor. Often, a watchful animal owner or attendant is the first person to recognise sick animals and has to describe the history of patient to the doctor. Effective detection and reporting involves attention to some details.

Common signs of sickness

In veterinary medicine, disease is defined as the inability to perform physiological functions at normal levels even when nutrition and other environmental requirements are provided at adequate level to the animals. By this definition, not only the clinically ill animals come into the diseased category but also those that do not perform as expected. Thus, diseased animals may be classified into three categories:

Change in appetite is one of the foremost signs of diseased animals. There may be change in feeding behaviour, intake of feed, mastication or swallowing and belching in sick cattle

i. Those affected with a clinical disease condition capable of producing recognisable clinical signs like fever, breathing difficulty, convulsions and lameness.

ii. Those suffering from sub-clinical disease condition, without any apparent signs of illness. In this form of disease, no abnormality is recognised unless the profiles of milk yield growth rate and reproduction are monitored regularly.

iii. In other situations, animals show no clinical signs of disease except poor performance such as weakness and reduced milk yield.

In general, an unhealthy animal can be identified by considering the following:

- Change in behaviour such as separation from group; sluggish, dull or indifference response, anxiety, restlessness, hyper-excitation including abnormal movement with vigour, violent licking of own body or other inmate objects, jumping and kicking.
- Voice abnormalities like hoarse, soundless bellowing. Yawning and continuous lowing may also be reflecting illness.
- Change in appetite, especially partial to complete anorexia (off feed) is one of the foremost signs of diseased animals. There may be change in feeding behaviour, intake of feed, mastication or swallowing and of belching in sick cattle and buffaloes.
- Cattle and buffalo are categorised as ruminants. Their stomach has four distinct compartments known as rumen, reticulum, abomasum and omasum. Rumen is the largest part and is involved in fermentation of feed. The contraction of rumen, termed as 'ruminal movement' can be felt by firmly placing fist on upper hollow triangle on left flank. Absence or feeble rumen contraction indicate illness due to common diseases like milk fever, indigestion and grain over feeding and such others.
- Ruminants also ruminate, which is characterised by jaw movement for re-mastication of regurgitated feed bolus. Rumination is reduced or completely absent in certain conditions particularly associated with fever and rumen disorders. Thus, it is easy to spot sick cattle or buffalo by looking at their mastication after feeding.
- Frequency, volume and character of faeces (stool) are changed in animals suffering from diseases of the digestive system and liver.
- Change in colour, volume, frequency of urine indicates disease condition, particularly involving kidney and associated organs.
- Abnormal posture, gait (movement), bodily condition (obese, thin or emaciated), shape and size of different body regions and such others point to the unhealthy state of animals.
- Skin is a true reflection of health and its abnormalities such as alopecia; discoloration of hair or wool, itching and bleeding can be spotted from a distance.

Identifying sickness

Signs of disease easily detected from a close inspection of body regions like head, neck, thorax, abdomen, udder and limbs help in identifying a sick animal. In some conditions, changes are so specific that these can provide clues for definite diagnosis of

Photo source: www.canyonwholesale.net

the disease. For example, facial rigidity, dilation of nostrils and prolapsed third eyelid occur in tetanus; excessive salivation or frothing at the mouth denotes painful condition of mouth. Cattle with bulging paralumbar fossa (hollow triangle on left flank) may be suffering from bloat and a grossly enlarged asymmetrical swelling of the abdomen suggests herneation of the abdominal wall.

Physical examination

Following the distance examination and close visual inspection of body systems or regions, physical examinations involving audiovisual inspection, palpation, auscultation, percussion, ballottement and tactile percussion are conducted to ascertain sick animals. Some of these techniques need skill of an experienced veterinarian. Other examinations such as temperature, pulse, respiration, state of hydration, and ruminal movement can be monitored by trained para-veterinary personnel or animal owners.

Body temperature in animals is taken generally with a rectal thermometer. A conventional clinical thermometer for human use can also be used for animals. The bulb end of the thermometer is lubricated and gently inserted with a rotary action through the anus into the rectum. The thermometer is tilted slightly to make contact of the bulb with mucous membrane of the rectum and held for two minutes. Then, it is taken out and wiped gently to remove the 'stool stain and particles' with the help of the cotton swab. The reading is recorded and the thermometer is cleaned before storage and use on the next patient.

Touching the tip and base of the ears and observing the colour of eyes and moistness of the muzzle can make an approximation of body temperature. Dry muzzle with brick red colour conjunctiva is a sign of high temperature in cattle and buffaloes. Fever is commonly accompanied by varying degrees of depression and loss of appetite, increased respiration, shivering in the early stage and decreased urine output.

Pulse is taken at the middle coccygeal (tail) or facial arteries in cattle. The pulse rate depends on heart rate but may or may not entirely represent it. Respiration or breathing movements are examined from a distance, preferably with the animal on standing posture. The respiration rate may be counted by observation of nostril movement or by feeling the nasal air movements by placing the palm about 2-3 cm in front of nostrils. Body temperature, pulse and respiration (TPR) are known vital signs. Values of these signs for cattle and buffaloes are: temperature: normal 380C (100.50F), critical: 390C (102); pulse 60-72/minute and respiration 20-30/minute.

Common diseases

Farm animals encounter a number of disease conditions, which can be categorised as infectious and non-infectious diseases. Infectious diseases are caused by bacteria, viruses, fungi, internal (worms) and external parasites and other types of infectious agents. The non-infectious diseases occur due to physiological or morphological abnormalities of body organs, metabolic defects, nutritional imbalances and deficiencies, chemical and plant poisoning, hereditary defects and physical injuries. Some important clinical signs and salient tips for treatment and control measures for the most common diseases such as ketosis and milk fever need to be understood.

High milk-yielding cows and buffaloes kept on poor energy diet suffer from energy deficiency leading to ketosis. The disease is more common in cows and buffaloes during or subsequent to the third calving and may also be associated with diseases causing reduced feed intake. There is gradual but moderate decline in feed intake and milk yield and body weight is lost rapidly. Temperature, pulse and respiration rates remain normal. Animals show woody appearance and faeces are scanty. Moderate depression, ketene smell (like rotten apple) from the mouth, walking in circle, crossing legs, head pushing or leaning into the stanchion, apparent blindness, aimless movement and wandering are also seen in ketosis. The treatment of disease consists of drenching propylene glycol (200 – 400 ml) and corticosteroid injection.

Milk fever is another frequently reported metabolic diseases of high-yielding dairy animals. The condition, also known as parturient paresis, is caused by decrease in body calcium just before or within 48 hours after calving. Dairy cows and buffaloes in third calving or older are more commonly affected. Signs include lack of feed intake (anorexia), brief stage of excitement, diminished rumen movements, scanty faeces, general weakness leading to sternal recumbency with flank watching, no milk let down, weak pulse, dry muzzle, mental depression, hypothermia, weak heart sound, dilated and sluggish pupils, bloat, tachycardia and death. Temperature is below normal. Most cows and buffaloes respond successfully to the standard treatment consisting of intravenous administration of fluid containing calcium, phosphorous and magnesium. However, incorrect diagnosis and delayed or improper treatment cause complication and animal dies after prolonged illness. Other diseases include:

- haemorrhagic septicaemia, a deadly bacterial infection of dairy animals; brucellosis, a devastating bacterial infection of dairy animals that causes abortion in females and sterility in bulls;
- tuberculosis, caused by mycobacterium bovis bacteria (a disease that can be controlled by regular testing of herd using tuberculin test and removal of positive animals and hygienic measures to

Photo: Val and Mani

Suggested vaccination schedule for cattle and buffaloes

Disease	Vaccine type	Vaccination schedule time and age	Duration of protection	Remarks
Anthrax	Live attenuated spore vaccine	Pre-monsoon annual vaccination	One year	In known region of outbreak. Avoid using milk for 72 hours after vaccination
Black quarter	Killed	First two vaccination at 10 days interval, followed by pre-monsoon annual vaccination	One year	Also vaccinate sheep and goat
Haemorrhagic septicaemia	Adjuvant vaccine	Pre-monsoon annual vaccination	One year	Combined vaccines for FMD, BQ and HS are also available
Brucellosis	Cotton strain-19 live vaccine	First vaccination at 5-6 months age followed by vaccination in adult cow	3-4 calving	To be done only in infected herd or area
Foot & mouth disease (FMD)	Inactivated trivalent alum/ oil adjuvant vaccine	First dose at four month age, booster after 2-4 weeks followed by six monthly/ annual revaccination (2-3 weeks prior and six months after rainy season)	Six months	Indigenous cattle may be vaccinated annually. Pigs , sheep and goats should also be vaccinated
Rabies (post-exposure)	Inactivated TCV (CVBS Strain)	On day 0 (within 24 hours of dog bite), 3, 7, 14, 28 and 90 days after dog bite	-	Dose is 1 ml for all species

prevent spread of infection);

- paratuberculosis (Johne's disease), which is another chronic bacterial disease; anthrax, or splenic fever caused by bacillus anthracis;
- black quarter, also known as black leg, is an acute bacterial disease where infection spreads via wound or ingestion;
- colibacillosis, affecting newborn animals (mainly under three years), receiving inadequate quantity of colostrum;
- foot-rot, an infectious disease, generally occurring in the wet season; foot and mouth disease, the most serious viral disease in India causing enormous economic losses as it especially affects exotic breeds of cattle;
- rabies, a highly fatal and most dreaded viral infection, which occurs in all species of farm animals, especially cattle and buffaloes;
- trypanosomiasis (surra), a protozoan parasitic disease affecting dairy animals and other species of livestock; babesiosis (red water fever, cattle tick fever) caused by the protozoan parasite babesia;
- theileriosis, a protozoan infection, to which young exotic and crossbred cattle are highly susceptible to; fasciolosis (liver fluke infection);
- amphistomosis, a snail borne internal parasitic infestation of dairy animals; roundworm infection; ectoparasites with ticks, mites and maggots being common ectoparasites;
- simple indigestion;
- rumen impaction (grain overload);
- bloat or tympany in ruminants;
- traumatic reticuloperitonitis and pericarditis (TRP, TP, hardware disease) caused by ingested metallic wire, nails and other sharp objects by cattle and buffaloes are generally lodged in the second compartment of stomach known as reticulum;
- pneumonia;
- nitrate-nitrite poisoning caused by grazing on pasture or ingesting fodder that has higher levels of nitrite or nitrate suffer from this condition;
- cyanide poisoning caused by ingestion of cyanogenic glycoside containing plants, such as acacia, eucalyptus, sorghums and Indian grass causes cyanide poisoning; pesticide poisoning through accidental exposure to agri-chemicals.

Vaccination

Vaccination is the most cost-effective method for prevention and control of infectious diseases. Different types of vaccines are available for vaccination of animals. A general vaccination schedule for cattle and buffalo is tabulated here (suggested vaccination schedule for cattle and buffaloes). However, this schedule may vary according to climatic and disease outbreak situations. For successful vaccination programme, guidelines given by the manufacturer should be followed and deworming should be done at least one week prior to the vaccination. In general, vaccination should be taken at least 14-21 days prior to expected season of the disease outbreak.

Management of animal health is the most vital factor that significantly influences economic gains and sustainability of dairy farming. It involves wide range of practices such as preventive measures for infectious diseases, mastitis control, alleviating stress to animals, optimum quality nutrition, shelter management, clean milk production and proper cleaning of the dairy premises. Some guidelines provided here should help dairy farmers to maintain their animals healthy and derive better profit from dairy animal husbandry.

Management of animal health is the most vital factor that significantly influences economic gains and sustainability of dairy farming, involves a wide range of preventive practices

Deworming

This involves making an animal free from internal worm parasites by using anthelmintics and is popularly termed as 'deworming'. It is accepted that most Indian livestock harbour a variety of parasitic infections and deworming immensely helps in reducing financial losses due to worm parasites, in the form of poor production, infertility, stunted growth and death. Strategic deworming is advisable to reduce the cost of treatment and to avoid drug resistance. Special attention is needed on selection of proper anthelmintic and calculation of its dose. Periodic change in types of drug to be used is also necessary to maintain effectivity of the drug and avoiding development of drug resistance.

Ectoparasite control

Mites, ticks, midges and houseflies not only cause physical discomfort but also transmit serious infections besides causing anaemia and myaisis (maggots wound). The control of these ectoparasites can be achieved by:

- Use of fly repellents or agents such as organophosphates, ivermectin, moxidectin and doramectin to kill larvae of flies.
- Periodic use of ivermectin or deltamethrin is effective in control of myiasis. Maggot wounds can effectively be treated by a paste of peach leaves, which kills maggots within 24 hours. Use of turpentine oil swab is also effective.
- Spray and dips of insecticides such as organophosphates, carbaryl, amitraz and deltamethrin are effective in tick control. In case of small number of animals, insecticides can be applied with the help of cotton or brush.
- Special care should be taken to reduce toxicity to the handler and animal during spray and dipping operations. Atropine and other antidotal medicine should be kept ready for emergency. Severely wounded animals should not be sprayed and milk of lactating animals should not be used without proper washing of udder after spraying.
- Treatment of animal houses is also important for control of ticks and mites. In heavily infested animal houses, all the walls must be sprayed with insecticide. All cracks and crevices must be sealed with a paste prepared by mixing 200 ml strong

Photo: Dilip Banerjee

phenyl, 200 mg carbaryl or organophosphate and a kilogram of lime. Blow lamps can be used to kill ticks in small animal houses.

Care of newborns

Newborn are the future crop and good dairy herds are raised from them rather than purchased. Care and management of newborns need special attention during first few days. They are relatively inefficient in maintaining normal body temperature and their care and management starts even before their birth by proper care and feeding of pregnant cows. Immediately after birth, all membrane or mucus from mouth, nostrils, eyes and ear need to be removed by using a soft clean and dry cloth. In case the calf has breathing difficulty or does not breath, artificial breathing may be facilitated by pressing and relaxing chest wall. Aseptic removal of naval cord is important. The cord is tied about 2-3 cm away from its attachment and cut about one cm below the ligature. Antiseptic swab (tincture iodine) is placed on the stump for two or three days.

Calves are born without any passive immunity against infection and depend on adequate colostrum intake at right time to acquire adequate immunity. A buffalo or cow calf should ingest at least 2-2.5 litre of colostrum within first 24 hours of age. Suckling is a natural approach but nipple bottle can be used for feeding of calves that are weak and unable to suckle their mother. If colostrum is not available, a mixture can be prepared by mixing poultry egg in 300 ml water+ 50 ml castor oil+ 600 ml whole milk+ 10, 000 IU vitamin A. There are standard procedures that can be adopted to help manage the problem.

Mastitis management

Mastitis is a major problem in dairy herds with large number of exotic or crossbred cows. Disease occurs sporadically under rural conditions. Mastitis manifests in clinical and subclinical forms. However, a subclinical form can develop into a clinical form or cause chronic udder damage. High-yielding cows and buffaloes are more susceptible to mastitis. Dairy farmers suffer huge financial losses due to expensive treatment as well as loss in milk production. Therefore, control of mastitis is important in dairy animal health management, particularly at organised dairy farms. Regular monitoring of the infection rate by improving management practices and strategic treatment of infected quarters reduces the prevalence of mastitis. The following 10-point programme is recommended for mastitis control in organised dairy herds.

- Udder hygiene and proper milking management
- Proper maintenance of milking utensils
- Dry cow management and therapy
- Lactating cow therapy
- Culling of chronic mastitic cows and buffaloes
- Maintenance of appropriate environment
- Keeping proper records
- Monitoring udder health status
- Periodic review of udder health management

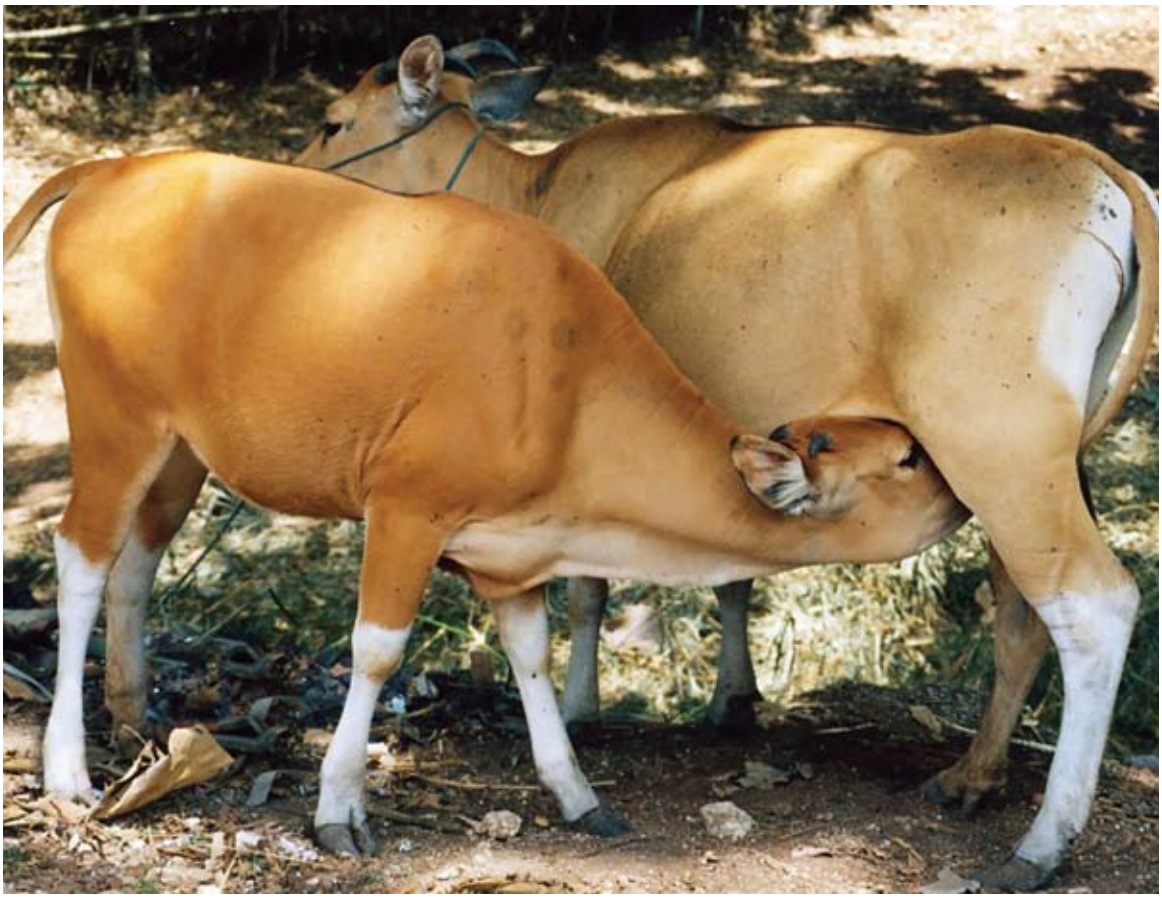


Photo: Rick Hawkins

• Deciding goals for udder health status

These apart, proper milking management and methods are important for mastitis control. As there are inadequate laboratory facilities to detect sub-clinical udder infection at drying off, and as most infections enter the udder during the dry period, it is advisable that all four quarters (teats) of high yielding cows and buffaloes be given dry cow therapy. This will not only prevent the new infection from occurring but will also eliminate most others present during drying off. The treatment of existing sub-clinical udder infections during the dry period will lead to quick regeneration of damaged mammary tissue. This assures better milk production during the next lactation.

Nutritional approaches

Feeding of dairy cows and buffaloes with a nutritionally balanced diet during dry period and lactation is helpful in reducing incidence of mastitis. In general, supplementation of zinc (180 – 360 mg) + methionine (360 – 720 mg) or zinc (2.5g) + copper (1 g) + selenium (1.5 mg) or Vitamin E (1000 IU for dry animal and 500 IU for lactating cow) + Selenium (3-6 mg) daily to cow/buffalo reduces occurrence of mastitis.

Checking udder health

Udder health can be manifested by physical appearance of udder and teat, and also by physical, chemical and bacteriological examinations of milk. Presence of clots, change in colour, presence of blood and abnormal smell indicate abnormal udder health and an experienced milking person can readily detect these changes. A simple cow-side test can be performed by using CMT (California Mastitis Test) paddle and CMT reagent, which can be prepared by adding 1.5 g sodium hydroxide, 0.5 ml Teepol, and 0.01 g bromothymol blue in 100 ml of distilled water. Take few strips of milk from different teats in different cups of paddle, and add the above reagent to it. Rotate the paddle slowly. Formation of flakes, gel and discoloration indicate presence of mastitis. A hand-held conductivity meter is also available to check milk for udder health. Increase in the milk conductivity reflects mastitis probabilities. On getting a mastitis signal from these simple tests, samples of milk from each quarter (teat) may be sent to a veterinary diagnostic laboratory in separate sterile test tubes for microbiological examination.

Care of heifers and infertility management

Care and management of heifers and reducing

infertility problem are vital for better productive and reproductive performance of dairy animals. Rearing period of heifers can be divided in two phases: weaning to first service and first service to calving. The age of the first service is decided by size and body weight. Crossbred heifers should weigh 200-250 kg at the first service. Most indigenous breeds are late maturing and show wide variation in their age, ranging from 39 months (Ongole) to 53 months (Gir) at first calving. The weight of two-year old heifers of indigenous breeds ranges between 230 and 280 kgs. Wide variation is also noted in age and body weight at first calving across different breeds of buffalo. The average age and body weight of Murrah and Nili-Ravi breeds are between 40 and 44 months and 450 kgs and 530 kgs, respectively. Surti, Bhadawari and Nagpuri buffaloes attain 46-54 months at first calving. Heifers need to be closely monitored at least three times daily to identify heat. Optimum floor space (2.5-3 square metre covered floor area) should be provided to heifers for their better growth and expression of natural behaviour.

Infertility is a major problem in cattle and buffaloes. In general, for profitable dairy entrepreneur, a cow or buffalo should ideally reach sexual maturity (breedable age) within 24-36 months and first calf should be produced early and subsequently at every 12-14 months interval. However, this does not happen in our country, especially in cases of buffaloes and cows maintained in rural areas.

The main reproductive problems in animals are:

- Late sexual maturity
- Long post-calving oestrus interval (normal interval is 30-60 days), service period and calving interval
- Anoestrus
- Repeat breeding, both in heifers and cows

Infertility can be treated with dietary correction but should that fail, hormonal therapy or correction of anatomical defects with the help of veterinary doctor should be considered.

Management of pregnant and calving cows and buffaloes

Pregnant animals are under physiological stress and need special care. They should be fed adequate quantity of balanced ration and not be put to violent exercise such as long distance walk, fast running and extraneous transport.

Special attention is required for animals at the time of calving. A cow having normal parturition should not be disturbed. In case there is some abnormality, a qualified veterinarian should be called in. Usually the placenta is expelled within four to eight hours of calving. Manual removal of placenta is advised if the period is prolonged beyond 12-18 hours. Cows should not be allowed to eat the placenta. High yielders, especially in 3rd and subsequent lactation are much prone to metabolic diseases like milk fever and ketosis and require special dietary care during pregnancy and peri-parturient period and given optimum feed.

Potable water

Water is an essential constituent of body (70 per cent of body weight) and milk (87 per cent), its requirement varying according to season and type of feed. Usually, under average feeding conditions a dairy cow or buffalo requires 30-35 litres of water for drinking, which covers the requirement for 10 kg of milk produced. An extra three litres of water per kg additional milk produced should be added to this requirement. Besides drinking water, 40-70 litres of water are necessary for washing and cleaning. In general, approximately 100-110 litres of water per adult animal should be provided for.

The quality of drinking water should be checked periodically for bacterial and chemical contaminants. Water rich in toxic metal and fluoride have been found to adversely affect health and production profile of dairy animals.

Shelter management

Housing is an important component of animal welfare and should be conducive to health and, natural behaviour of animals. Animals need comfortable environments with sufficient feeding, watering, cleaning, animal restraining, milking and waste disposal system. Large dairy units should have provision for separate shelters for animals of different age groups (calf, heifer, bull) and under different physiological (pregnant, lactating and dry cows) and health status. The building should

Infertility is a major problem in cattle. They should ideally reach sexual maturity within 24-36 months and first calf should be produced early and subsequently at every 12-14 months interval


Photo: chglobal.wordpress.com

have separate space for quarantine (to keep freshly introduced animals under observation) and isolation of sick animals. The building should also protect from extreme weather. In hot-dry and semi-desert region, provision of protecting animals from intense solar radiation should be made. There should be equal focus on preventing infectious agents and rodents from affecting the shelters.

Clean milk production

Food safety is an important global issue with international trade and public health implications. The issue has been dealt by World Trade Organization by establishing standards under sanitary and phyto-sanitary (SPS) regulations to ensure food safety amongst the food trading countries. Agreement on SPS measures applies to protect human or animal life from risks arising from additives, contaminants, toxins or disease causing organisms in their food, beverages, foodstuffs; human life from plant or animal carrying diseases (zoonoses); plant and animals from pests, diseases or disease causing agents and a country from damage caused by entry, establishment or spread of pests.

The Good Hygiene Practices (GHP), Good Agriculture Practices (GAP), Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Point (HACCP), and cold chain are some of the measures that have been introduced as the quality and safety assurance systems to achieve SPS standards. The agreement allows the member countries to set their own standards in the backdrop of international scientific norms and many countries have adopted food quality measure through ISO-9000 or HACCP standards. In India, a number of commodity related boards such as Agricultural and Processed Food Expert Development Authority (APEDA) and Export Inspection Council have been set up for certifying quality of food products and voluntary standards are being implemented.

Milk is the most important food product at a dairy farm. It is highly perishable and readily loses its quality if it is not produced from healthy animal and under appropriate hygienic and clean management system including production, processing and storage practices. If the animal and/or surroundings are not clean, the milk gets contaminated with bacteria and it can be a source of infection to consumers if animal is suffering from diseases like tuberculosis and mastitis. Introduction of the HACCP system is particularly important to maintain quality of milk. It includes recognition of hazards to the food safety, identification of measures to regulate and control hazards and establishment of preventive measures at critical control points.

Rodent control

Rodents (rats and mice) can be major problem at dairy farm as they propagate efficiently on farm premises providing them food and nesting sites. These animals not only consume, contaminate and spoil the food meant for dairy animals but also damage wood and electric wirings and can even harm new born calves. It is estimated that a colony of 100 rats can consume over a tonne of feed in a year. About 10 times the feed that a rat eats is contaminated by its droppings and urine. Damage to electric wire insulation may be extremely hazardous and even can be the cause of accidental fire. Rodents are the carriers of nearly 45 diseases, including zoonotic conditions like salmonellosis, pasteurellosis, leptospirosis, swine dysentery, trichinosis, toxoplasmosis and rabies. They can also spread several disease organisms through their feet. The breeding potential, adaptability and agility of rodents make their control particularly difficult. ●

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Rajni Devi's Troubled Terrain

The land and the loot; cow's milk sans the cream

Ajay Vir Jakhar

Across the Yamuna and the river Hindon, which now appears like a dirty drain, I head towards the suburbs of New Delhi in Greater Noida. Across swathes of high-rise buildings, factories and the prosperity of a shining India, I travel to visit the *aam aadmi*. This is the land of the Mahabharata; it was here that the famous Pandavas, who defeated the Kauravas and Karan, were looted of their belongings by the local tribes.

It is a sad sight today. In India's thriving democracy, the descendants of these daring warriors and farmers have been cheated of their land by successive governments through their policies of land acquisition. Greater Noida is the bright star of the state of Uttar Pradesh. It has the best infrastructure and brings to the state and its leaders unparalleled revenue. This reality is a nightmare of lost dreams and aspirations for the local farmers.

Rajni Devi and her husband, Chowdhary Bihari Singh, both members of the Bharat Krishak Samaj are residents of village Roopwas in Tehsil Dadri, District Gautam Budh Nagar, Uttar Pradesh. She is a lady of great distinction. The only lady *pradhan* (village head) of the district, she was also the first to be elected unopposed in 1988. Those were the days when "the other ladies of the villages asked their husbands: were there no men in the village that they had to choose a lady *pradhan*". Since then she has been elected many times; no eyebrows are raised any more.

Rajni Devi is a dairy farmer while her husband is

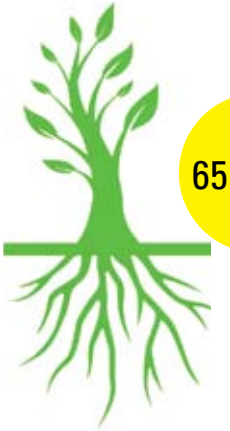
quite a famous social activist in Ghaziabad and the adjoining districts; his name is synonymous with the dairy sector. He has fought successive governments over land acquisition policies and for increased compensation. He talks of the consequences of the loot of farmer's land by the government over the years. "The compensation for acquired land in Noida was Rs 3 per square metre in 1976. Today, the price of the same land, developed at a very marginal cost, is Rs 600,000 per square metre." The pain of a society cheated of its ancestral land, fortune and the future is palpable.

Even today the price of agricultural land around village Roopwas is Rs 4,500 per square metre and the land acquisition rate is only Rs 700 per square metre along with some incentives to lure farmers, in order to stem any protests. The price for land acquisition has just increased from Rs 60 to Rs 700 over the last 20 years. From being owners of land and pride, the people have been forced to become employees of migrant factory owners. Their resentment is understandable.

on his recommendation, she directed then Finance Minister, T. A. Pai, to start a milk-for-millions programme. Under this, farmers only had to sign a Rs 2 stamp paper affidavit to procure a loan to buy a buffalo, then costing between Rs 2,000 and Rs 3,000. Up to 10,000 cattle were distributed in and around Ghaziabad under this programme with an impressive 96 per cent bank loan recovery from the farmers. Rajni Devi now feels sad that "banks have become inaccessible to farmers and one needs a tout to complete the paperwork in addition to providing security unlike before. Farmers have become irrelevant in the last decade", she rues.

Rajni Devi is a good businesswoman and has the numbers at her finger tips. The milk was sold for Rs 2 per litre in 1971. After 30 years, today it is Rs 21 per litre. This is distressing, given the rate of inflation and prices of other commodities. To make matters worse, milk production in the village has fallen to one fifth because most of the land has been acquired and there is little land to grow green fodder. One needs an acre of land to feed green fodder to seven animals. This

The price for land acquistion has just increased from Rs 60 to 700 in twenty years. The people have been forced to become employees of migrant factory owners



Land around Roopwas was acquired by the National Thermal Power Corporation (NTPC) in 1991. The original rate of acquisition was Rs 8 per square metre. After a three-year agitation led by Bihari Singh, the rate was increased to Rs 88. Ram Saran Das, the then Revenue Minister of Uttar Pradesh forced NTPC to undertake development work worth Rs 16 crore in 20 villages in 1992. The Corporation was also forced to employ 181 boys as Class IV employees at its plant. In hindsight, what seemed as a victory then was actually a lost battle. Out-smarted because of their inability to look into the realty future, farmers have been fooled by successive governments, who act like the private sector luring farmers with short-term gains.

Bihariji also helped start the "milkman's train", which runs from Dhankad station to Delhi and halts at places like Ajaipur and Dadri. More than 1, 700 people from 200 villages still travel on this train with their milk cans at 4 o'clock in the morning and return to their villages by 10 am to do another roundtrip from 3 to 8 pm every day. Bihari Singh was a close associate of the late Indira Gandhi and,

could vary from place to place but the declining space has made dairying unviable because one is forced to buy green fodder crops like *Barseem*, *Javi* (oats) from October to March, *Makka* (maize), *Bajra* (millet) and *Jawar* (sorghum) from April to September. These are used in combination with *bhusa* (wheat straw).

In the dry months of May, June and July only *bhusa* is used because green fodder is not available. She also uses Taj Gold brand superfine feed from Kaithal, Haryana, in combination with other home-grown fodder. While green fodder costs Rs 1.50 a kg, *bhusa* is Rs 4 a kg and cattle feed Rs 12 a kg. A combination of all these, costing around Rs 100, is to be fed to the animal every day. *Barseem* is very good protein source for the animal.

The livestock has other critical uses at home because Rajni Devi uses *gobar* gas (biogas made from dung) for cooking. In winters, the gas output drops because of the cold. However, it can be an expensive proposition to buy quality animal resource. "A good cow costs around Rs 40,000 and a good buffalo Rs 80,000". A relative of her neighbour recently sold his buffalo for Rs 160,000 in Fathebad, Haryana,

"The quantity of milk produced in the village has dropped, so no private company procures milk from here and villagers still travel to Dadri or Delhi to sell their milk"

she says. No wonder Rajni Devi prefers to keep Holstein cows rather than *desi* cows. The 'Murra' buffalo is a common breed.

Rajni Devi explains the milk economics. From a litre of milk, 150 grams to 200 grams of cream can be obtained and the remaining milk can still be sold. Pure milk is commonly standardised to have six per cent fat. The cows at her farm produce milk with 10 per cent fat. Cow's milk, she explains, has 4.5 per cent fat and buffalo's eight per cent. A Murra gives up to 17 litres of milk per day, for six months a year, for 10 years and a H4 Holstein cow (also called HF) gives up to 28 litres a day, for eight months in a year, for 14 years while a *desi* 'Sahiwal' cow only gives 18 litres per day for seven months in a year for 13 years. An H4 Holstein is dark in colour with white patches.

Yet good livestock is a source for good milk, which is increasingly difficult to find. Rajni Devi explains: "Delhi has no pure *khoya* (pure thickened milk). Milk powder, potatoes and arrowroot (*singhada*) are mixed to make *khoya*. Butter oil, which is imported into the country is made from animal fat and sold as desi ghee (home-made clarified butter) by Indian manufacturers. Adulterated milk is very common and it gets into the milk collection system easily. It is difficult to check for adulteration." The quantity of milk produced in the village has dropped, "so no private company procures milk from here and villagers still travel to Dadri or Delhi to sell their milk". This redoubtable lady shakes her head in sorrow.

There are also health issues for animals. True, there is a "government veterinary doctor but he comes irregularly and charges Rs 250 per visit". If he is not available, "the cattle have to be taken to the veterinary hospital". There are problems within the community itself. "Mahila Dairy Groups were started but were not successful due to the constant disagreements between the ladies themselves".

There are additional costs too; of insurance, for instance. Many states refund the cost of annual insurance, which is four per cent of the valuation of the animal. Normally the valuation is 80 per cent of the market value and if an animal dies one gets 90 per cent valuation of the animal. There is also the question of hard-to-hire farm hands. Rajni Devi says that "it is difficult to find people to look after cattle even after paying Rs 6,000. The cow is the ultimate creature of habit. A cow, which is loved by the owner, is not only better behaved but also gives more and better milk, everything else remains the same".

As for the farmer; he survives not so much on how much money he makes but on much he does not spend! Worthy words of rustic wisdom. ●

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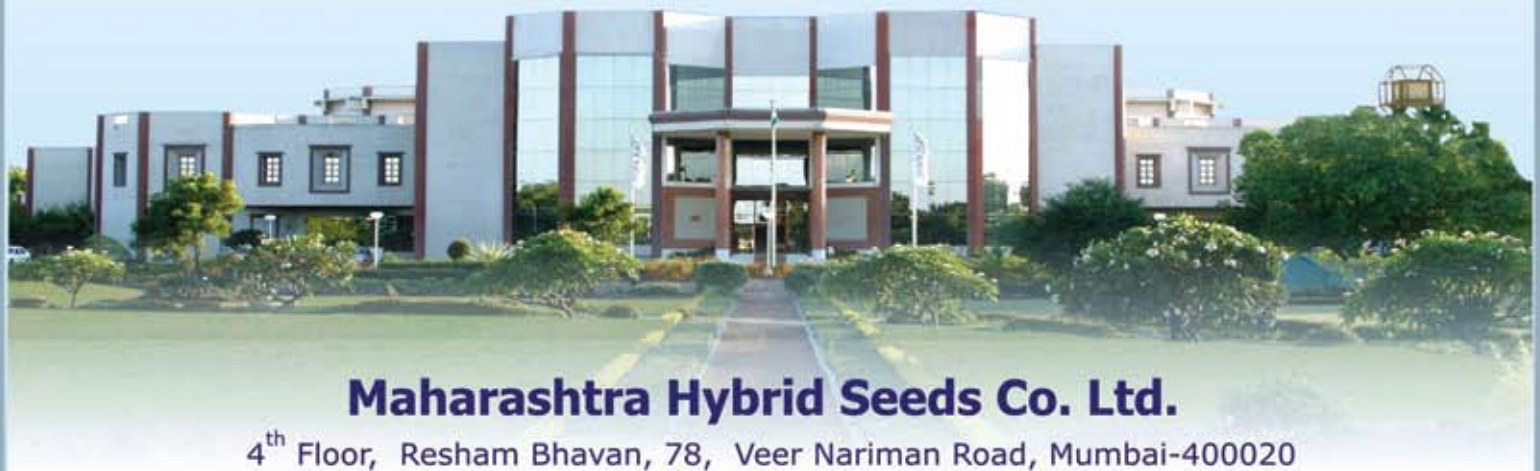

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