₹80/-

JUNE 2024

AGRICULTURE TODAY

The National Agriculture Magazine

VOLUME XXVII | ISSUE 6

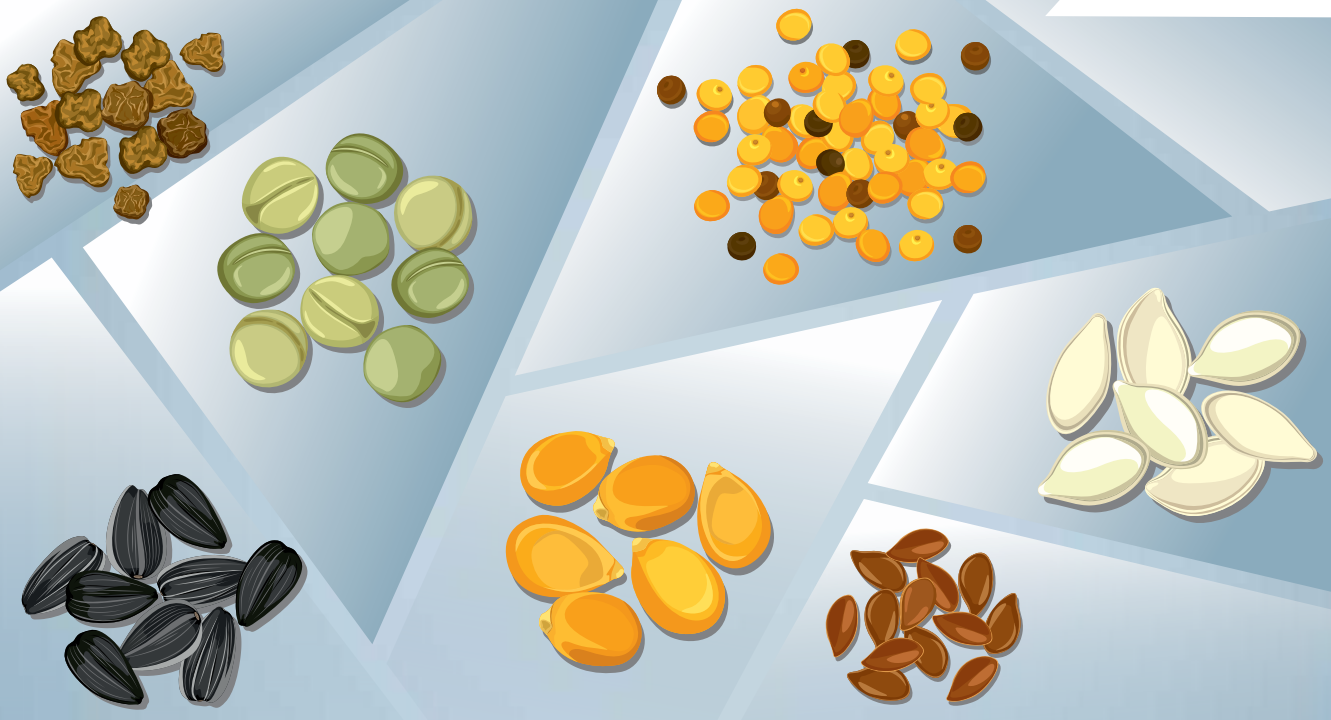
www.agriculturetoday.in

WHITE REVOLUTION 2.0

Closing gaps

PAHWA GROUP
Innovation is life

Bry-Air®



CONTROL MOISTURE©

During seed drying and seed storage

Bry-Air...Your
Humidity Control Partner

BRY-AIR (ASIA) PVT. LTD.
21C, Sector-18, Gurugram - 122015
Haryana, India

+918826990350
1800 102 7620

bryairmarketing@pahwa.com
www.bryair.com

OVERSEAS OFFICES
Malaysia • China • Switzerland • Brazil • Nigeria • Vietnam • Indonesia • Philippines • Korea • Japan • UAE • Saudi Arabia • Bangladesh • USA • Canada

BAA/Seed/2023-24

President
Dr. MJ Khan
Group Editor
Mrs Anjana Nair
CEO & Editor
Dr. Mona Singh
Editor, Agri News
Sanjay Kumar

STATE HEADS OF ATG BUREAUS

Andhra Pradesh
Satish B Gadde
Assam
Jyoti Bikash Nath
Bihar
Girendra Narayan
Gujarat
Rakesh Jani
Haryana
Bijender Singh Dalal
Himachal Pradesh
Rakesh Kumar
Karnataka
Santosh Langer
Maharashtra
Pasha Patel
Madhya Pradesh
Rakesh Dubey
Punjab
Puneet Singh Thind
Rajasthan
Parvinder S Chauhan
Telangana
Jaipal Reddy
Tamil Nadu
Raju Narasimman
Uttar Pradesh
Umesh Shukla
Uttarakhand
Narendra Mehra

SUPPORT TEAM

Admin & IT Head - Anil Kumar
IT Manager - Ankit Kumar
Assistant Editor - Zaman Almas
Asst. Manager, Digi Mktg - Tanya Kalra
Web Designer - Mr Rahul Singh
Graphics - Akash Bhargav
Subscription - Mohd Aijaz
Field Officer - Sumit Gaur
Circulation - Rajkumar

DESIGN

Graphic Designer
A. Rehman

COVER PICTURE CREDIT - SNEHA KOPPULA

Publisher & Printer – Dr. MJ Khan on behalf of M/s Concept Agrotech Consultants Limited, Published from 306 Rohit house Tolstoy Road New Delhi-110001 and printed by Everest Press E-49/8, Okhla Industrial Area-II New Delhi-110020
Phone No. 011-23731129 Fax No.011- 23731130
E-mail: editor@agriculturetoday.in
info@agriculturetoday.in

No part of this magazine can be reproduced, imitated or transmitted in any form, including electronic, mechanical, photocopying, recording or any information stage retrieval system or extracted in any way without permission from the publishers. Views expressed in the magazine need not necessarily be those of the Editor / Publisher.

www.agriculturetoday.in
Page in the magazine: 60

SUSTAINABLE DAIRY MANAGEMENT

India is the largest producer of milk in the world contributing 24.64% of global milk production. The milk production of India has registered 58% increase during the last nine years. Milk is the single largest agricultural commodity contributing 5 per cent of the national economy and employing more than 8 crore farmers directly.

But importantly, our milk production is distinctly unique and quite different from rest of the major dairy producing nations. One by fourth of the world's milk production comes from the low input, low output model. Out cattle subsist on residues of crop and those left after human consumption. It is a sustainable model. As the inputs are not of high nutritional value, they result in lesser milk production. The big numbers in milk production that we are able to generate therefore comes from the cattle population- the largest in the world. We have more cattle and therefore we produce more.

Although dairy is projected to continue its winning streak in terms of total production, we need to closely examine these numbers and analyze whether they are sustainable environmentally and will keep pace in a world that is fast changing in terms of climate, consumer preferences and animal health.

Livestock emissions – from manure and gastroenteric releases – account for roughly 32 per cent of human-caused methane emissions. The global warming potential of methane is 21 times higher than that of CO2. India being the highest milk producer and housing the largest cattle population appears guilty. The fact that it is also a source of income and nutrition to 8 crore people may not always protect us from this reproach. Besides, India has an ambitious target of net zero emissions by 2070. So, we have to develop a plan in time that protects the livelihood of rural population and integrity of the planet.

Primarily, we have to reduce the number of animals by investing in genetically superior breeds and on feeds that help to increase productivity and reduce methane emissions. Fortunately, there are a number of strategies that can be employed to increase the efficiency of the sector.

Through this dairy special edition, released on June 1 coinciding with World Milk Day, we were able to connect with many stakeholders who had an interesting perspective or story to share in dairy management. This issue is a modest attempt to document those efforts and pique the interest of stakeholders.

CONTENT

VOLUME XXVII | ISSUE 6 | JUNE 2024

Organiser

CENTRE FOR AGRICULTURE AND RURAL DEVELOPMENT

Co-organiser

NEBIF NORTH EAST BUSINESS AND INVESTMENT FORUM

Supported by

सत्यमेव जयते

MINISTRY OF DEVELOPMENT OF NORTH EASTERN REGION

VIBRANT NORTH EAST

19-21 SEPT 2024

Srimanta Sankaradeva Kalakshetra, Exhibition Ground, Guwahati

UNLEASHING THE ECONOMIC POTENTIAL OF NER

For Sponsorship & Stall Booking, Please Contact :

Mr. Tushar Sharma, Director-CARD
+91 8874184076, tushar.sharma@card.org.in

Mr. Shobhit Srivastava, Regional Director - CARD
+91 9621361577, shobhit.card@gmail.com

SCAN HERE TO REGISTER

www.vibrantnortheast.in

MARCHING TOWARDS WHITE REVOLUTION 2.0

India is the number one producer of milk and currently contributes to one fourth of global milk production. "Our goal is to increase it to one third of global production," says Dr. Meenesh Shah, Chairman, National Dairy Development Board. In an exclusive interaction with Agriculture Today, Dr Shah gives an overview of Indian dairy sector, and discusses how the industry is shifting towards sustainability.

Currently we are the number one producer of milk in the world. In terms of efficiency in production, where does Indian Dairy stand?

India has come a long way from being a milk deficit nation in the pre independence era, to being the largest milk producer in the world today. It is the single largest agriculture commodity that contributes to almost 4-5% to the nation's economy. The industry provides employment to 8 million households and produces milk worth Rs. 10 lakh crores (2021). Milk production in India is growing at a CAGR of more than 6 % and our production stood at 230 million tonnes during 2022-23. We are contributing to one fourth of the global milk production. But what separates India from other developed nations is the small holder dairying system, with each farmer managing just about 2-3 animals. It is a low input and low output system where crop residues are fed to the animals - a model that is economically sustainable and more revenue generating to the farmers. The productivity of our animals is 2000 kg in a year against 5000 kg in developed countries. We have to definitely work on improving the productivity through a multifaceted approach by enhancing the genetic potential, health and feed of our animals.

> "Feed constitutes 70% of the total cost of milk production in India.

Can you elaborate on the strategy to improve the production systems?

We are in the process of enhancing the production potential, sustainability and efficiency of our dairy system. This will create a solid platform to launch the White Revolution 2.0. In the next one decade, we will be in a posi-

tion to contribute to one third of the world milk production. We will have better and healthy animals, we will organize more dairy cooperatives, we will increase the percentage share of milk and milk products with the ultimate objective of increasing the revenue of farmers. Our emphasis will be on selecting dairy animals for higher milk production, higher resilience to heat tolerance, better feed efficiency among other things.

Dairy accounts for sizeable emissions in greenhouse gases, and for a country like India with the largest number of cattle population, what strategies can be adopted for climate smart dairy farming?

We have taken a number of initiatives to address dairy sustainability, which includes improving agricultural practices including feed additives that can reduce methane emissions. We have also introduced the ration balancing programme, which by the use of a software analyses the nutritional profile of the feed ingredients used by farmers and suggest a nutritionally balanced diet for the animal based on the same feed ingredients. This has found to reduce methane emissions by almost 15%. Another way by which can reduce the emissions is by reducing the number of animals i.e., to increase productivity. As part of decentralized manure management, we supply a 2m^3 biogas plant to the farmers with 3-4 animals which is enough to meet the cooking needs of his family. Resultant slurry can be converted into manures. Women beneficiaries of biogas plant are being organized into cooperatives. We have already formed a first of its kind, 'Khad Mandli' that produce and sell organic manure to other farmers. Around 25,000 household level biogas plants have been installed so far. Besides our involvement in Govardhan scheme, we have started to work on large scale biogas plant. In Varanasi, a 4000 m^3 biogas plant has been established, the biogas from which fuels the boilers for processing 1.5 to 2 lakh litres of milk . We also have a provision to generate electricity from surplus biogas. In Banaskantha district, Gujarat our biogas plant utilizes 50 tonnes of dung to be used for vehicle mobility. Four more plants are being set up in Banaskantha with the financial assistance form Suzuki.

> **The industry provides employment to 8 million households and produces milk worth Rs. 10 lakh crores (2021).**

Animal feed is an area of concern in terms of quantity and quality. How can we address that?

Feed constitutes 70% of the total cost of milk production in India. We are experiencing a shortage of 40% in green fodder, 20 % in dry fodder and above 30% in concentrate. NDDB is helping government in distributing fodder seeds to farmers. Last year, we facilitated dairy cooperatives in producing about 1.5 lakh quintals of high yielding fodder seed varieties. We are also working through FPOs. FPOs buy fodder from farmers and convert them into silage. They are also involved in supplying fodder seeds, collecting crop residues and supplying feed supplements to the farmers. We are trying to develop a value chain in fodder FPOs. Another way of ensuring nutritional feed to dairy animals is by preparing and distributing the 'Total Mixed Ration', which is prepared at dairy society level in village and supplied to small and marginal farmers at reasonable price. To reduce the burning of crop residues, we are buying it from the farm and mixing it with cattle feed.

With intense heat waves and changing climate affecting the milk production and productivity, what changes can be brought about to protect the interests of the dairy farmers? In general, how can the animal health improved?

Pashudhan is a new app designed by TCS that stores all data on the animals including that of ownership. Out of the 30 crore animals, we already have the data of 28.5 crore animals. The app is also designed to provide advisories to farmers and through this awareness on how to manage them during heat stress is provided. Insurance instruments to compensate for the losses due to climate extremes can be worked upon. In the long run, focus will be on development of indigenous breeds, as they are more heat resilient. To minimise the use of antibiotics, ethnoveterinary medicines are being developed. We could treat 80% of diseases through this. We are working with 25 cooperatives to eradicate mastitis through ethnoveterinary medicine. Formulations for 30 common ailments have been developed. The E Gopala app which is available in 11 languages addresses the problems related to health, breeding, feeding etc.

NDDB was started with the the mission of making dairying a vehicle to a better future for millions of grassroots milk producers. Six decades since its inception, do you think NDDB has achieved its objective?

Even during covid times, dairy was the uninterrupted lifeline for rural India. For more than 6 decades, dairy has been a dependable source of income. We have become the largest producer of milk due to the concerted efforts of the small and marginal farmers, and committed professionals at NDDB. Anand pattern, where farmers are the owners, was a tool that provided maximum revenue out of consumer rupee for farmers. Dairy had an important role in women empowerment. Our work is not done here. There is still scope for increasing cooperative coverage. Currently, we are working in 2 lakh villages and we plan to expand it. The unorganised sector still controls two thirds of the market. We are trying to increase the share of organised players. Currently, our focus is to bring the benefits of cooperative system to every nook and corner of the country.

EXPERTS SPEAK

‘INDIAN DAIRY SECTOR HAS TO BECOME MORE COST COMPETITIVE’

Dr. RS Sodhi, Former Managing Director, AMUL has more than four decades of rich experience in leading & developing cooperative sector within Indian dairy industry. Having served dairy farmers in several capacities, Dr Sodhi worked under direct guidance & mentorship of father of white revolution, Dr. Verghese Kurien. In an insightful interaction with Agriculture Today,
Dr. RS Sodhi, President, Indian Dairy Association and Chairperson, NIFTEM -T discusses the opportunities and challenges that exists in the Indian dairy segment.

Is the Indian Dairy completely living up to its potential?

Indian dairy farmers are definitely harnessing the best potential of the sector. The dairy sector in India is owned by 80 million farmer families, out of whom 70 % are landless and marginal. Among all the rural livelihood avenues, dairy has shown exemplary performance despite the inherent constraints of low productivity, less automation etc. Our milk production in the last fifty years has been growing consistently at a CAGR of 4.8%. Every 25 years our milk production multiplies by three times and in last fifty years our milk production increased by ten times. In spite of the population multiplying by 2.5 times, the per capita availability has increased by 4 times. Our Dairy Model is that of low input and low output and on this unique model, we have built the world’s most efficient dairy supply chain where 70-

> “If India needs to continue to grow at the same pace, we have to increase the domestic consumption and increase exports

80% of profits goes back to the farmers. So naturally, our farmers are happy. The consumers are also happy as they are getting quality food at affordable price at their convenience. As these two main stakeholders are happy, this industry has become envy of the world. This is the only industry which Indians can feel proud as this our own creation. Green revolution was a borrowed concept. The white revolution on the other hand, was developed by our farmers and policy makers. But still, there is a lot to achieve. The scope of revenue generation from dairy segment will increase as consumption of protein and fats in increasing and we need to keep pace with it.

What are the aspects that need to be taken care of to keep pace with the growing dairy sector?

Our production is bound to grow and so is our population. If India needs to continue to grow at the same pace, we have to increase the domestic consumption and increase exports. We cannot continue to increase the price of milk and expect the consumers to buy at that rate. We have to make it more affordable. Similarly, we should work towards exporting 110 Mt per annum in next 25 years. Indian dairy sector has to become more cost competitive. This can only be achieved by reducing the unit cost of production. Currently our feed conversion ratio is very low and our aim should be to increase it. This can be achieved by getting better breed of animals and resort to better feeding practices. Farmers' income should increase not by increasing price but by increasing productivity.

Why was cooperative model such a big hit in dairy? Do you believe that even today cooperative model is the best model?

It is the best model. The reason being farmers own the whole supply chain from production to marketing. They make it more efficient without wastages. By creating a very efficient supply chain, they have created benchmarks for industry to follow. No where in world does farmers get 70-80% of the returns. This model can be replicated in any country where the dairy is in the hand of small holders.

> Currently our feed conversion ratio is very low and our aim should be to increase it.

In terms of sustainability where do you find Indian Dairy?

In India, milk production is of low input low output model, where we feed animals whatever that is left after human consumption; the emission per liter of milk is 2-3 times higher than the other dairy based economies. But our per capita emission of GHGs is only one by tenth of these countries. Nevertheless, we need to improve. One way of doing this as I have mentioned is to increase productivity. This will bring down per litre emission. But in my perspective, Indian dairy sector is sustainable. We feed animals whatever roughage is left in the field, otherwise we would have to burned it. The roughage is thereby used for creating a nutritious superfood meant to feed 1.4 billion people. The dung is used as organic manure or converted into biogas. How can we say that it is not sustainable? We have to learn to differentiate. The emissions here are part of earning livelihood and not a part of leading a luxury life. I believe sustainability starts when stomachs are full.

Value addition is a big area in dairy sector and how has Indian Dairy adjusted to it?

India's value addition in dairy is much better than the rest of the world. India is a country of lower middle class. They look for value delivery than value addition. If milk costing Rs 50 is converted into curd and packed in fancy packaging and sold for Rs.150, there will be few takers in India. If the same curd is packed in a modest plastic bag and sold for Rs. 60-65, it is called as value delivery. Value addition has been misinterpreted.

What are the challenges ahead of Dairy sector?

The current biggest challenge is that of productivity. Also, there is the important task of motivating the next generation farmers to continue in milk production. Without their help, we cannot sustain our current dairy production, let alone increasing productivity. So far, we have been fairly successful in not including our dairy in free trade or bilateral agreements. Other major challenges include dearth of feed and fodder, increasing number of dry animals, animal health etc. We have to realise the market demand and work towards fulfilling it. For example, now there is a general consensus that animal fat such as ghee is good for health. There is a renewed demand for milk with more fat. In such a scenario, we need to encourage buffalo milk production, as we know the fat content in buffalo milk is double that present in cow's milk.

What are your suggestions to the newly formed government?

I would say to continue the existing policies of encouraging local milk production as it forms the keystone of our rich dairy heritage. The sector needs more funds and it will be in good interest of the dairy segment, if the budgetary allocations be made on par with that of agriculture. Another important area that I would like to bring to the focus is the tax levied on ghee. Today ghee is taxed at 12%, whereas imported edible oil is kept at 5 %. It doesn't make any sense to tax something produced by the farmer high, whereas an import commodity low. Besides, ghee is a healthy alternative to palm oils. I would request the government to examine this matter and to make tax on ghee on par with that of other edible oils.

MYTH, MYSTERY & MAGIC OF MILK

"I love milk so much! I make a point of drinking a glass of milk every day. So now anyone who did those milk ads with the milk moustaches, they're my heroes," Natalie Portman, the celebrity Hollywood actor and heartthrob of millions, describes her passion for her most preferred food which the cultures across the world refer to as the "food of the gods."

Immense Health Benefits

Today, we have widely recognized milk as a complete food. Apart from Calcium and Phosphorous, it is a dependable source of Protein, Potassium, Phosphorus, Vitamin D, Vitamin B12, Vitamin A, Riboflavin (B2) and Tryptophan an amino acid, the sleep inducer. Apart from physical health, milk is traditionally recognized as an effective source of upliftment of mood and spirit. According to the Hindu religion, milk has the properties of purifying the body and soul. It is universally accepted as the fluid of eternal life, fertility and abundance. In some religious and cultural traditions it is known as the food of the gods and the earliest human food. In short, the belief that milk not only gives strong physical health and high energy but is also a provider of intelligence and knowledge is universal. It is ironic that while we may be consuming this healthy and nutritious food item, in one form or another, daily, the World Milk Day, June 1 generally passes in silence except for the formality of a few events bereft of the noise and grandeur displayed in celebrations of other diverse days.

> More than 75 crore people in the world are associated with the dairy business.

History of Milk

As milk was recognized as food only 10,000 years ago it would be labelled as a modern day product considering that the history of humanity dates back

About the **AUTHOR**

Tarun Shridhar, Former Secretary, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India

to more than 3,00,000 years. Historians generally agree that animal husbandry was initially limited to the supply of meat, hides and hair of sheep, goats, cattle and pigs. Dairying entered into the realm of animal husbandry much later.

From Curd to Milk

Milk contains a special type of sugar called lactose, which is different from the sugar found in fruits and other sweet foods. During childhood, the body produces a special enzyme called lactase which digests lactose in mother's milk. But in most people, after weaning from milk in childhood, the production of this enzyme stops. Without lactase, it is difficult to properly digest the lactose in milk. As a result, bloating is common due to drinking too much milk. Meanwhile, the process of fermentation was understood by humans, which is why in the early years of dairy farming, only cheese, yogurt, and other fermented (yeast) products were consumed. Gradually genetic mutations enabled the human body to produce lactase even in adulthood. This created a distinct advantage in communities that consume milk and milk products because raw milk is more nutritious and calorie dense.

The first people to regularly drink raw milk were farmers and herders in Western Europe. And among these people, complaints of flatulence and gas were widespread in the early stages. But when evolution started keeping the lactase enzyme active into adulthood, the habit of drinking milk without any side effects became widespread. Some people still do not have the ability to produce enough lactase in the body, and hence could drink milk only in small quantities. They are better off processing the milk into butter, curd or cheese, all of which reduce the lactose content. This is one of the reasons why humans invented curd and cheese very quickly. It is said that people in Southern Europe started making curd and cheese about 7000 years ago. Milk ferments rapidly, so it is through these products that lactose intolerant people could get the benefits of milk's nutrition and other goodness, not to mention the taste and flavour.

The total value of our dairy produce in the year 2021-22, at current prices, was a staggering 9,95,215 crore, higher than the combined value of wheat and paddy during the corresponding period which stood at 6,01,313 crore.

Milk and Its Many Manifestations

Milk has also been a powerful social and cultural symbol in various civilizations. In the mythology of the Sumerians, Greeks and Egyptians, milk was a symbol of spiritual purity. Some communities in West Africa believed that the world began with a drop of milk. And according to a Norse legend from Scandinavia, a cow made of ice kept the world safe in the early days. It is also believed that milk is the creator of our universe; our galaxy is called the "Milky Way". Butter was once so rare and valuable that people used it only in religious ceremonies. The practice of using butter in various rites is still prevalent in India. In ancient Rome and Greece, rich people applied it to their hair to make it shiny.

Along with these deep cultural ties, milk also had a negative context in many early civilizations. At one time in Greece, people who consumed milk and dairy products were considered barbarians and even publicly reprimanded. As it was drunk primarily by farmers and poor people, milk was considered a low quality food in Rome. Northern Europeans would be ridiculed for their love of reindeer milk. The Japanese Buddhists derided the Europeans for their milk drinking habit and even gave them the abusive title of "stinking butter".

Indian Scenario

Today milk has emerged as the most popular food in the world; it is consumed in each and every country by an estimated seven billion people. More than 75 crore people in the world are associated with the dairy business. It is a matter of pride for us that we have been sitting at the top in milk production for many years. A paltry trickle of 17 million metric tonnes (mmt) with a per capita per day availability of 130 grams in the year 1950-51, early years of our independence, has grown into a flood of 230.6 million tonnes constituting one fourth of the global milk production. The number two country behind us is the USA, but then it is a distant second with production not even half of ours. Isn't it a sterling achievement!

To add to the crowning glory is our share in the global production of ghee and butter which stands at 40%. Per capita per day availability is 459 grams against the global average of 322. The total value of our dairy produce in the year 2021-22, at current prices, was a staggering Rs.9,95,215 crore, higher than the combined value of wheat and paddy during the corresponding period which stood at Rs.6,01,313 crore. So, it is important that we understand and recognize the importance of milk in our economy and life today; and for a better tomorrow too.

When the"grapes are sour" they may not be worth any effort. But sour milk is precious; it gives us succulent cheese. Nothing short of a miracle: a food even in going bad creates another delectable food. The photographer before capture wants you to give a smile. And he exhorts us the milky way, "say cheese." Let us celebrate the incredible milk and "Say Cheese" to the millions of our dairy farmers.

MILKING THE FUTURE

TRADITION MEETS INNOVATION IN INDIA'S DAIRY INDUSTRY

Milk holds a special place in India, extending far beyond its role as a dietary staple. It carries profound cultural and historical significance, intertwined with religious practices, festivals, and daily rituals. The Indian dairy industry is not only a cornerstone of the country's economy but also a crucial element in agriculture and rural development. The Operation Flood (1970-1996), played a pivotal role in transforming India from a country facing acute milk shortages to the world's largest milk producer. This initiative, often referred to as the White Revolution, revolutionized the dairy industry by creating a nationwide milk grid, increasing milk production, and establishing a robust dairy infrastructure.

The Dairy Processing and Infrastructure Development Fund (DPDF) offers a 2.5% interest subsidy on loans to upgrade milk processing and chilling plants

Challenges in Dairy Sector

Approximately 97% of dairy farms in India have only two cattle, while farms with 100 or more cattle are extremely rare, constituting just 0.03% of the total. The issues in all four major pillars of milk production namely breeding, feeding, health and value chain need to be identified, assessed and mitigated to exploit full potential of the sector. Traditional feeding practices and limited veterinary services further reduce productivity. Additionally, the scarcity of high-quality

About the **AUTHORS**

Dr Praveen Malik, Former Animal Husbandry Commissioner DAHD, CEO; Dhruva VC , Business Mnanager;
Ashav-veer Singh Pannu, Asst. Buisness Manager , Agrinnovate India Ltd.

breeding animals and ineffective breeding programs hamper genetic improvements.

Poor farm management practices and limited access to credit and financial services hinder investments in better infrastructure and technology. The high cost of modern dairy technology and a lack of access to up-to-date information on best practices and market trends further exacerbate these inefficiencies.

Safety and quality issues are critical concerns. Milk adulteration with water or other substances compromises safety, while the presence of pesticides, mycotoxins, heavy metals, and veterinary drug residues poses serious health risks.

Impact of Climate Change

Climate change presents significant challenges for animal production and food security, with implications for both human and animal populations:

Heat Stress and Production Losses: Rising temperatures and extreme weather events can cause heat stress in livestock, leading to reduced feed intake, decreased productivity, and increased susceptibility to diseases. These factors can contribute to food shortages and higher food prices.

Altered Disease Patterns: Changes in climate alter the distribution and prevalence of vector-borne diseases, posing risks to both animals and humans. The spread of diseases like Lyme disease and West Nile virus can strain public health systems and increase healthcare costs.

Food Safety Risks: Climate change influences the occurrence of mycotoxins in feed crops, contaminating animal products and posing risks to human health. Stricter regulation and monitoring of food and feed safety standards are essential to mitigate these risks.

Key Government Initiatives

The Dairy Processing and Infrastructure Development Fund (DPDF) offers a 2.5% interest subsidy on loans to upgrade milk processing and chilling plants. The Animal Husbandry Infrastructure Development Fund (AHIDF) boosts milk and meat processing capabilities, diversifies product offerings, and encourages exports. The National Programme for Dairy Development (NPDD) improves milk quality and enhances organized procurement, processing, and marketing. The Kisan Credit Card (KCC) scheme provides timely credit support to livestock farmers, simplifying access to working capital. The Rashtriya Gokul Mission (RGM) focuses on genetic improvement of bovine populations and the preservation of indigenous breeds to increase productivity and profitability.

Precision livestock farming employs AI-integrated sensors and wearable devices to monitor vital parameters, enabling real-time data analysis and optimized feeding strategies

These initiatives collectively aim to transform the Indian dairy sector by improving productivity, ensuring quality, enhancing infrastructure, and providing better market access. The government's proactive approach is vital for the sustained growth and development of the dairy industry, contributing significantly to the economy and rural livelihoods.

Harnessing AI for Sustainable Farming

Artificial Intelligence (AI) and Machine Learning (ML) are transforming dairy operations by revolutionizing traditional farming practices into modern, data-driven processes. AI/ML technologies are pivotal in enhancing productivity, animal health, and sustainability across rural farms and large-scale facilities. Precision livestock farming employs AI-integrated sensors and wearable devices to monitor vital parameters, enabling real-time data analysis and optimized feeding strategies. Automated systems, such as AI-powered robotic milking and feeding systems, reduce labour costs, ensure udder health, and minimize waste. Data-driven decision-making through AI/ML algorithms provides insights into animal behaviour and productivity trends, while environmental data aids in resource allocation and health management. Personalized nutrition plans, formulated by AI, boost milk yield and overall productivity. Predictive analytics help detect and prevent diseases, while AI-powered telemedicine offers remote veterinary consultations. Furthermore, AI enhances environmental monitoring and sustainability, and improves supply chain transparency and traceability. Integrating AI into dairy farming is crucial for modernizing agriculture to meet industry demands and challenges effectively

Integrated Efforts

In the rapidly evolving landscape of India's dairy industry, the significance of animal breeding, nutrition and health cannot be overstated. From ensuring global food security to safeguarding public health, the well-being of livestock plays a crucial role in meeting increasing food demand. Leveraging technological advancements like Artificial Intelligence (AI) and Machine Learning (ML), it is time to revolutionize traditional farming practices and pave the way for a sustainable future. India beholds the vision of 2047 for dairy sector with an estimation of increase in Global milk production by 45 per cent and an aim to have export surplus of around 111 MT. Through integrated efforts in disease surveillance, prevention, and control, alongside responsible antibiotic use and AI-driven solutions, India can ensure the well-being of animals, protect public health, and secure the future of the dairy industry for generations to come. In process of milking the future, it is time to uphold the values of tradition while embracing innovation to create a thriving dairy sector that nourishes both people and the planet.

MILK FOR ALL

ADDRESSING ACCESSIBILITY AND AFFORDABILITY

Milk is amongst one such natural superfood that is commonly consumed across the globe, and when the world celebrates this food category in particular, it does instil a sense of pride when you know your own country has indisputably demonstrated its prowess in milk – be it the vast dairy network which is till date unmatched in the world or of the fact that milk is the most valued crop of India.

World Milk Day, celebrated every year on June 1, reminds us of the importance of milk

About the **AUTHOR**

Mr. Manish Bandlish, Managing Director, Mother Dairy Fruit & Vegetable Pvt Ltd.

and celebrates the dairy industry's efforts in providing nutrition to billions of people. For more than two decades, India has been the largest milk producer – ranked 1st in the world – and currently contributing over 24% of global milk production. As we commemorate this special occasion, it becomes imperative to revere our heritage and comprehend the fact that there's still so much potential in making this magical potion accessible to all.

Milk's Integral Role in Indian Nutrition and Food Security

In our country, the importance of milk in our lives has been recognised since time immemorial. It is also the most affordable and easily available source of protein, and also offers vital nutrients including calcium, and other minerals. Given our diverse population with varying dietary preferences, India's average daily protein intake is considered to be the lowest among Asian countries. Therefore, the inclusion and proportion of milk in our diets, serves as an important function.

Furthermore, milk's versatility is one of its greatest strengths. This versatility serves as the foundation for a wide variety of products with different forms and flavours, thereby catering to different tastes and dietary preferences. From a simple glass of milk to traditional delicacies like lassi, chaach, curd, butter, paneer, and ghee, to even contemporary favourites like yogurt, flavoured milk, cheese, dairy-based beverages, etc., milk and milk products integrate into diverse Indian cuisines, enhancing both taste and nutritional value. The adaptability of milk in different culinary contexts is seamless and endless.

In the context of food security, the dairy sector emerges as a reliable ally as India fights the complexities of feeding a growing population. For instance, milk is also fortified to enhance its nutritional profile, adding essential vitamins and ensuring that even those who might not have access to a diverse diet can still receive critical nutrients necessary for their overall health. Further integration of health and wellness along-with innovation in the dairy industry presents opportunities for businesses to differentiate themselves and meet the evolving preferences of consumers through a single commodity, i.e., milk.

The dietary guidelines 2024, released by Indian Council of Medical Research (ICMR) – National Institute of Nutrition (NIN) in May 2024, states that over 50% of India's disease burden is due to unhealthy diets, making it all the more important to recommend a daily intake of 300-400 ml of milk to meet the nutritional needs across age groups. Milk is a wholesome food, and it plays an important role in providing many essential nutrients that are important for one's overall health. This highlights the importance of our approach to nutrition, particularly the inclusion of nutrient-dense foods like milk and milk products as regular staples in our diet.

In the context of food security, the dairy sector emerges as a reliable ally as India fights the complexities of feeding a growing population

Enhancing Milk's Accessibility and Affordability

India is not only the largest producer of milk, but is also the largest consumer. Over the years, there have been excellent efforts from various entities to enhance infrastructure and make milk more accessible and affordable. The Operation Flood Programme implemented during 1970-1996 spearheaded by Dr. Verghese Kurien bringing about White Revolution in our country — laid the groundwork for transforming India's

dairy industry, and today, the dairy co-operatives and the producer owned institutions continue to build on this legacy. This movement today is being spearheaded by National Dairy Development Board under the dynamic leadership of Dr Meenesh Shah through various initiatives and innovation that have not only helped increase milk production but has also ensured that farmers remain the ultimate beneficiaries. In fact it is a winning proposition for the end-consumers also by ensuring easy access to safe and hygienically packed milk and milk products across the country.

A major role in this journey has been played by the Central and State Governments who have been providing necessary policy, regulatory and financial support to the farmer centric interventions. Indian dairy entities – co-operatives and other companies alike – have invested heavily in modernising infrastructure, building efficient supply chains, and robust frameworks, ensuring that the benefits of the White Revolution continue to resonate across the country. These efforts ensure that a basic food product like liquid milk reaches a wider market for consumption.

Over the years, the development of state-of-the-art processing plants, cold storage facilities, and efficient distribution networks have significantly improved the availability and quality of milk and milk products. As a result, the Indian dairy sector continues to thrive, supporting rural economies and contributing to the nation's food security and nutritional well-being.

Over the years, the development of state-of-the-art processing plants, cold storage facilities, and efficient distribution networks have significantly improved the availability and quality of milk and milk products

Gift Milk Program

The Gift milk Program by NDDB Foundation for Nutrition, spearheaded by the National Dairy Development Board (NDDB) through its Foundation for Nutrition (NFN), is one transformative initiative aimed at addressing nutritional deficiencies among selected government school children in India. This innovative program, launched in 2016, targets children aged 5 to 15 years attending selected government schools or institutions catering to underprivileged students. By providing 200ml of vitamin A and D fortified flavoured milk with 3% fat content on every school working day, Gift Milk contributes significantly to the nutrition and overall well-being of these young learners.

Likewise, there are multiple initiatives by the Government of India and the Food Safety and Standards Authority of India (FSSAI), that are aimed at transforming the country's diet system, while enhancing awareness about eating safe and nutritious food, including milk and products.

Great initiatives like these indeed have the potential to yield positive outcomes in ensuring food security, as we strive for a holistic development of the country. From being a basic staple to becoming a highly diversified and value-added industry, our country has cemented milk's position as an essential component of the global food and beverage market. While significant progress has been made, there is still a long way to go and a lot to do in our journey towards ensuring widespread access to essential nutrients, promoting appropriate eating habits, and achieving overall well-being for all. Additionally, the OECD-FAO Agricultural Outlook 2023-2032, released in July 2023, states that India is projected to play a vital role in driving global growth in milk production between 2023 and 2032, therefore, focus also needs to be laid towards the inclusive development of the entire value chain.

As the global community commemorates World Milk Day, it is essential to recognize the Indian milk industry's embrace of upcoming trends and insights, positioning itself for a promising future and be a prime example for other food sectors to follow.

ENROLL NOW | www.sabm.org.in | 100% Job Placement

School of Agribusiness Management

"Nurturing Excellence in Agribusiness"

PROMOTED BY

ICFA
भारतीय कृषि एवं खाद्य परिषद्
INDIAN CHAMBER OF FOOD AND AGRICULTURE

"Explore Your Potential and Talent at SABM"

ADMISSIONS OPEN

FOR 2024-26 BATCH

2 Years Full Time MBA Agribusiness

KEY FEATURES :

- ✓ Industry Promoted
- ✓ Industry Driven
- ✓ 100% Guaranteed Placement *

AFFILIATED TO

INTEGRAL UNIVERSITY

REGISTER NOW

For admission queries, please contact :

+91 9311983204, 9289288337 | +91-11-41501465, 41501475

Email : admission@sabm.org.in | info@sabm.org.in

Visit us at :

www.sabm.org.in

#sabm #mbaagribusiness

INDIAN DAIRYING: AN OPPORTUNITY

"I am in the business of empowerment. Milk is just a tool in that." This simple statement of Late Dr. Verghese Kurien indicates the essence of the White Revolution, a movement that made India leader in milk production. From 17 MMT with a per capita per day availability of 130 grams in the year 1950-51, it has grown to 230 MMT, constituting one fourth of the global milk production. In India, the dairy industry plays a very important role in the country's socio-economic, culture development and constitutes an important segment of the rural economy. Dairy industry provides subsistence to millions of houses in villages, ensuring supply of quality milk and milk products to people in both urban and rural areas. However, the value creation is largely dependent upon the breed and health of animal, management and feeding practices, managerial skills and marketing.

Growth for value creation

Dairying in India has grown by leaps and bounds in the last seven decades of

Per capita per day availability of milk stands at 459 grams, higher by 137 grams over the global average of 322.

India's independence is the fact known to us. People also refer it as global powerhouse in milk production. From a milk deficit to becoming the largest milk producer has been an exciting journey in which small and marginal farmers have been the driving force of the sector. The industry has grown significantly over the last 20 years, supported by initiatives from the government resulting into compound annual growth rate (CAGR) of 6.0%. This has helped over 100 million farmers in seeking self-employment & entrepreneurship.

To add to the crowning glory is our share in the global production of ghee and butter which stands at 40%. Per capita per day availability of milk stands at 459 grams, higher by 137 grams over the global average of 322.Owing to the increasing demand for dairy products by the growing population, higher purchasing power of the customers and an expanding aversion for unbranded and loose products, the government

About the **AUTHORS**

Dr Anup Kalra, Executive Director Ayurvet Ltd., CEO, Ayurvet Research Foundation
&
Mohanji Saxena, Former M.D. Ayurvet Ltd., Managing Trustee ARF

estimates that milk production should reach 628 MMT over the next 25 years. India's Export of Dairy products was 67,572.99 MT worth $284.65 Mn during the year 2022-23. The top 5 milk-producing states are: Rajasthan (15.05%), Uttar Pradesh (14.93%), Madhya Pradesh (8.6%), Gujarat (7.56%) and Andhra Pradesh (6.97%). They together contribute 53.11% of total Milk production in the country.

Uniquely positioned

The total value of our dairy produce in the year 2021-22, at current prices, was a staggering Rs. 9,95,215 crores, higher than the combined value of wheat and paddy during the corresponding period which stood at Rs. 6,01,313 crores.

India currently accounts for 24 per cent of the world's milk production. India's milk production has been growing at a CAGR of 6%, while the world average is at 2%. If this growth trend continues, over the next 7-10 years, we will have a one-third share in the global output, which will be very important for India enhancing its share in export market to sustain growth in milk production. Marketwise, butter and spreads are expected to expand by 8% CAGR, to reach $4.2bn by 2026.

Our share in the world dairy market is less than a per cent. Dairy exports are largely targeted to cater to the demand of our diaspora. India is uniquely positioned to cater to the world market, especially to the countries in South-East Asia, neighboring Sri Lanka, Bangladesh and also in West Asia which are import dependent for the milk products. With India set to increase its share in the global milk production over the next decade, it is time to look at expanding the share in export market.

Points to Ponder

The average milk yield (kg/ cow/year) in India, USA and Poland is 1248, 9633 and 5504 respectively. The average farm size (cows/farm) in India, USA and Poland is 2, 182 and 8 respectively. Apart from the absence of quality breed and business scale, tropical and temperate climate have posed additional challenges to Indian dairy farming. The situations get more pronounced in dry region of western parts of our country.

The market growth in Dairy requires support of significant infrastructure investment across processing, chilling, logistics, cattle feed etc.

The other important points are Infrastructure in terms of numbers of chilling centers at village level, Efficient cold chain distribution network, Feed and fodder and reduction in grazing land. Small, marginal farmers and landless laborers engaged in dairy farming cannot afford to buy expensive feed and fodder. Further, non-supplementation of mineral mixture causes mineral deficiency diseases and metabolic disorders. High feed cost and lack of remunerative prices for milk to the farmers has posed a great challenge. However, cooperatives are extending support to farmers associated with them. No incentives are available for the corporates.

Breeding system

Most of the breeds require prolonged period to attain maturity and they usually have increased calving interval. These factors affect efficiency of animal performance.

Education and Training

Education and training on Animal Health & Good Farming Practices is an essential requirement for the farm employees. Adequate Veterinary health care, proper vaccination and regular deworming need to be ensured for sustainable production. Unhygienic farming practice leads to disease of cattle and buffalo. This also compromises the quality of milk resulting in spoilage of both milk and milk products.

Government support

The market growth in Dairy requires support of significant infrastructure investment across processing, chilling, logistics, cattle feed etc. Further, lucrative untapped opportunities exist in areas such as value-added dairy products, organic/ farm fresh milk and exports. To facilitate the infrastructure growth, Central/ State Governments have released various incentives to attract investments in this sector. Animal Husbandry Infrastructure Development fund (AHIDF), is one of the flagship schemes by DAHD, Government of India, whereby INR 15,000 Cr fund has been setup for offering financial support to set up new units or expand existing units in areas of dairy processing & related value addition infrastructure, meat processing & related value addition infrastructure and Animal Feed Plant.

Needs Closer Look

While appreciating the dairy sector, other dimensions are equally important to be looked at. The cooperative network, till date, manages only about 20 to 25% or so of the country's total milk production. Though we are largest milk producer, the stark contradiction gets soured by our position near the bottom in the per animal productivity. Also, the high per capita availability does not address the prevalence of malnourishment; most milk still reaches the market unprocessed despite the huge dairy industry.

Future Outlook

Future should see us moving from absolute production to quality. A premium on hygiene and improved quality of livestock management, including nutrition should address part of the issue. This should find further support through breed improvement interventions; healthier the animal, better the product. Value addition in the form of an increased shelf life or more milk products need closer look. All this would mean more profits and better exports.

DAIRY HEALTH MANAGEMENT FOR ENHANCED PRODUCTIVITY

India is world's largest producer and consumer of milk. Its per capita consumption stands at 459 g per day which is well above the world average. Indian dairy sector is largely self-sufficient in milk production, with 80 million rural households engaged in milk production and around 10 million employed full-time. Nearly the entire dairy produce in India is consumed domestically, with the majority being fluid milk. India's consumption of fresh dairy products is expected to increase by 2.3% annually, which holds a tremendous potential for value-addition and overall improvement.

More than 70% of India's milk production is from smallholder farmers, with an average herd size of 1–5 milch animals. Dairy farms sized from 50-200 cattle are increasing although they are still very less and the shift towards medium to large-scale dairy farms will continue. However, small & marginal farmers will remain relevant in India. Demand for dairy is expected to grow due to population increase, rising incomes and increasing trend of higher consumption of value-added products.

About the **AUTHOR**

Dr Arun Atrey, Managing Director and CEO, Zenex Animal Health

Challenges in Indian Dairy Sector

The dairy sector is facing many challenges. Low productivity, chronic shortages of feed & fodder, large population of unproductive cattle, absence of effective extension system, inadequate animal health coverage & diagnostic facilities, immunization and hygienic programme, lack of cold chain logistics, unorganised marketing, etc. are the pre-dominant constraints affecting the rate of its growth of the sector. The production potential has not been fully realized because of the constraints related to breeds, feeding, breeding and health management. Less number of animals on balanced cattle feed accounts for half of the total losses, followed by the problems of breeding & reproduction and diseases. Fluctuations in demand and milk prices is another concern for the dairy farmers. It also discourages progressive farmers from growing their herd size, as incomes are volatile and risky.

Current Trend in Health Management of Dairy Cows

Vital management areas for most herds include nutritional management, milking management, animal welfare, sick animal diagnosis and treatment. Veterinary services are improving in its reach to customers and getting more specialised. There has been increased adoption of preventive approaches for disease management with vaccination, nutritional and hygienic measures. Adoption of such practices has increased the demand for quality medicines, animal feed additives, hygiene management prod-

ucts, vaccines etc.

The need for continuous improvement in the sustainability of livestock production necessitates better health for animals. Providing health needs for the huge populations of animal is a significant challenge as well as an opportunity. Animal healthcare companies are working continuously to deliver new medicines and technologies to build a better world for animals, people, and the environment.

Nutritional Products

With the increasing trend of enhancing productivity of animals especially in dairy animals have created more demand for precision nutrition. Currently, many nutritional supplements are available for fulfilling specific nutritional need as per health & productivity of individual animals as well as to maintain rumen health of the cows along with production & reproduction efficiency. Ration balancing with essential macro- and micronutrients appears to be the most practical concept. Also, some institutes have developed digital Apps for balanced rations with different feed ingredients.

Traditional medicines or Ethno-veterinary Practice

Ethnoveterinary medicine is silently playing a vital role in sustainable livestock production. They are very dynamic & multifunctional, and scientifically proven for controlling a variety of livestock illnesses. The traditional medicine systems predominated in India for control of various ailments in human and animals. In the face of climate change, the growing demand for high quality animal products, and the increasing awareness of One Health concept, consumers across the globe prefers use of safer & eco-friendly products for increased sustainability in animal production. In the context, continued efforts have been made to meet the challenge of developing eco-friendly, alternative medicines for curing various metabolic and infectious diseases.

Cows that are well-cared for not only produce high-quality milk but also have a better quality of life.

Diagnostic Facilities

Inadequate Veterinary diagnostic facilities in India attract huge scope for diagnostics to address the needs of the farmers. For example, early detection of pregnancy, early embryonic death and for diagnosis of metabolic & infectious diseases like Mastitis, Ketosis etc., it will be helpful for dairy fraternity. Many animal healthcare companies have introduced such diagnostic kits. However, those kits are not very convenient and economic to use at farmer's doorstep. Several Indian Research institutes are currently focusing on translational research and to develop newer diagnostics for use at dairy farms. Recognition of diagnostics not simply as a tool for diagnosis of diseases, but also for their prevention, will drive overall health of animals effectively.

Digital Revolution in dairy sector

Health management relies on data collection and analysis to identify trends, monitor performance, and make informed decisions. Digitization of dairy has led to more productivity and less expenses on dairy management in the developed countries. In India, many start-ups have entered into the space and going forward, may bring revolutionary changes in the Indian dairy sector. Utilizing advanced monitoring systems, automated feeding equipment, and health tracking software can streamline management practices and improve outcomes. While we are looking to strengthen the dairy infrastructure by embedding necessary technologies at different levels such as biometrics for cattle identification, IoT devices etc., a great window of opportunity also exists for empowering the farmers by facilitating educational training programs at digital platforms for making dairy business profitable. Adoption of modern technologies holds a great potential to help the growth in the dairy sector.

Holistic Growth

In recent years, there has been a growing emphasis on holistic growth in the dairy sector, which focuses on sustainable and responsible practices to ensure long-term growth and benefits for all stakeholders. Holistic growth in the dairy sector also emphasizes the importance of investing in animal welfare. This involves providing a safe and comfortable environment for cows, ensuring proper nutrition and healthcare, and promoting natural behaviour. Cows that are well-cared for not only produce high-quality milk but also have a better quality of life. This can lead to increased milk production and a reduction in health problems, ultimately benefiting both the farmer and the animal.

Way Forward

In the dairy sector, India has enormous potential for more production, innovation, and export. To enhance milk production, the country must improve the productivity of animals by emphasizing their health needs through proper feed and fodder. The Government is initiating various activities to improve the genetics of animals to increase productivity and mitigate the risk of diseases. Regular collaboration with veterinarians, nutritionists, and other dairy professionals is key to improved milk production, reproductive efficiency, and overall profitability. Animal healthcare industry has been playing a significant role in disease mitigation, health & nutrition of animals, improving productivity of animals; with significant investment in the veterinary products manufacturing, Industry is able to provide best possible veterinary solutions to the large livestock population. The availability and accessibility of credit financing for small dairy farmers must be improved so that they can upgrade farm management procedures and infrastructure which ultimately enhances milk production.

THE ROLE OF DAIRY IN ENHANCING RURAL LIVELIHOODS

India's dairy industry, a vibrant tapestry woven into the nation's economy, nutrition and rural livelihoods, is a global powerhouse of development. With over 75 million dairy farms, predominantly small-scale operations, it is the world's largest milk producer, a testament to the resilience and ingenuity of its farmers. At the heart of this thriving sector lies BAIF Development Research Foundation an organisation whose unwavering commitment to innovation and farmer empowerment has revolutionised dairy farming in India.

Dairy isn't just a source of livelihood for millions of farmers; its also a critical contributor to India's nutritional security.

Deep Roots, Rich Tradition: Dairy's Enduring Legacy

Dairy farming in India is more than just an economic activity; it is a way of life, deeply ingrained in the cultural fabric of rural communities. For generations, families have reared cattle, not only for milk but as a symbol of wealth, security and sustenance, resulting in a unique bond between humans and animals and laying the foundation for the industry's remarkable growth. Dairy isn't just a source of livelihood for millions of farmers; its also a critical contributor to India's nutritional security. Milk and milk products provide essential nutrients, particularly for women and children, playing a vital role in public health and well-being. In addition, the dung, traditionally used for cooking purpose is used as manure for enriching the soil and for organic farming practices.

Pioneering Dairy Innovation and Empowerment

In the mid-1960s, when the Government of India launched a massive programme to organise milk collection and processing through the National Dairy Development Board (NDDB), Dr. Manibhai Desai, the Founder of BAIF realised the potential of producing high yielding cattle progeny at the doorsteps of small farmers owning low yielding nondescript cows. This out-of-the-box solution acted like a miracle! With the breeding services provided by BAIF, millions of small farmers were able to produce high yielding cows which yielded 2000-2500 kg milk/lactation from cows which yielded less than 200-300 kg milk per year, without any capital investment or other risks. Thus, a large number of small farmers even from drought prone areas were able to contribute to India's White Revolution, while ensuring their own food security. This was indeed a breakthrough!

BAIF's contribution to the dairy sector spanning more than 56 years, reflects its commitment to innovation, farmer empowerment and sustainable development. A pioneer of Artificial Insemination (AI) services at the doorstep of farmers using conventional semen produced from 18 indigenous cattle, 10 buffalo breeds, crossbreds and exotic breeds and manufactured at its state-of-the-art semen freezing laboratory near Pune, BAIF has not only ensured access to superior quality genetic material by the remotest of villages but also introduced sorted semen technology, enabling farmers to select the desired gender of the offspring.

About the **AUTHORS**

Shrinivas Kulkarni, Group Vice President – Finance, BAIF and Dr. Jayant Khadse, Vice President - Livestock Development and Scientific Research, BAIF

Development of Feed Resources

Development and release of four Bajra and three Napier Hybrid forage varieties, use of unconventional feed resources by ensuring their value addition through different feed technologies have ensured fodder availability. Inter-disciplinary research with focus on land–soil–water–crops–trees-livestock integration, have increased the efficiency and profitability of dairy farming significantly. This groundbreaking initiative, coupled with production of cattle feed supplement, improved fodder seeds, planting material and other inputs, has empowered farmers to improve the genetic potential of their herds significantly, resulting in healthier, more productive animals and increased milk yield. Technologies like genomic selection, early pregnancy diagnosis, OPU-IVF, estrous synchronization, clean milk production, silage making and ethno-veterinary practices are being piloted for replication in the field.

Reducing Methane and Capacity Building

BAIF aims at achieving reduction in methane emission intensity through genetic improvement, use of sex sorted semen by eliminating unwanted male calves, promoting Harit Dhara - an anti-methanogenic feed supplement and dung management to reduce emissions, producing green fertilisers and enabling carbon reuse and carbon credits.

Nevertheless, our commitment to farmer empowerment transcends genetics. We have invested decades of comprehensive capacity building programmes, equipping farmers with the knowledge and skills necessary for modern dairy practices. Our training covers animal nutrition, health management, milk quality control and efficient record-keeping to ensure that farmers can succeed in the evolving dairy landscape.

Empowering women is at the heart of our mission. Our programmes specifically target women, providing them with the tools, resources and knowledge to become successful dairy entrepreneurs. By encouraging women's leadership and economic independence, we are transforming individual lives and strengthening entire communities.

Strengthening Farmer Economics

Central to BAIF's mission is strengthening the economic viability of dairy farming for smallholder farmers. Input costs such as feed and healthcare, can significantly impact farmers' profitability. Providing high quality, affordable breeding services, feed supplements and other inputs help to reduce the costs, allow farmers to earn more from milk production. Moreover, by controlling input costs and supporting fair prices, a sustainable model can be created where dairy farming not only uplifts livelihoods, but also empowers farmers to invest in their future.

A Nation United for Dairy Development

Our efforts are part of a nationwide movement to propel the dairy sector forward. NDDB has established a robust infrastructure for milk collection, processing and marketing, ensuring a fair price for farmers and quality products for consumers. Other Cooperatives, Milk Unions and Private Dairies have also empowered farmers by giving them a collective voice and ownership in the industry.

Government policies have also played a significant role in fostering the growth of the dairy sector. Subsidies for cattle breeding and purchase, loans for dairy infrastructure and minimum support prices for milk have encouraged farmers to invest in dairy farming. The Government is also investing in research and development and supporting cutting-edge advancements like livestock genomics, to enhance milk yield and productivity.

Technology and Innovation in Dairy

The dairy sector is adopting technology to enhance efficiency, productivity and sustainability. Digital platforms connect farmers with buyers, providing real-time information. Mobile apps offer farmers access to veterinary advice, weather forecasts and best practices. Precision livestock farming technologies optimise animal health and nutrition, while artificial intelligence and data analytics revolutionise disease prediction, breeding and supply chain management.

Milking the Potential: A Bright Future

The future of dairy in India shines bright. With a growing population and increasing demand for milk and milk products, the industry is poised for continued growth. BAIF's dairy husbandry-based livelihoods programme is being operated through a network of more than 4300 Cattle Development Centres across 321 districts in 14 states providing breeding services to 3.3 million small farmers from 90,000 villages with around 5.2 million Artificial Inseminations per annum. The programme is creating estimated assets in the form of 6.76 million genetically improved cows and buffaloes yielding 8.18 million tons of milk per annum and contributing approximately Rs. 222.46 billion to the rural economy annually.

BAIF's dedication to innovation, farmer empowerment and sustainable practices will continue to shape the future of India's dairy sector, ensuring its growth and contributing to the nation's prosperity.

Transforming the Dairy sector in India

The dairy sector in India is not just an industry; it's a way of life. With over 300 million bovines, including cows and buffaloes, India boasts of the world's largest dairy herd. This massive population contributes to the production of over 230 million tonnes of milk annually. The importance of the dairy sector in India cannot be overstated; it serves as a source of nutrition for millions and plays crucial role in providing rural livelihoods.

With a rapidly growing population, the demand for dairy products is also increasing. According to the National Dairy Development Board (NDDB), the per capita availability of milk in India has been steadily rising at a CAGR of around 6 percent in the last decade, reaching 406 grams per day in 2020-21. With over 80% of dairy farms being small-scale or marginal, the sector provides additional employment and income opportunities to millions of rural farmer households.

KEY TRENDS

- **Increasing adoption of modern dairy farming practices**: Farmers are increasingly adopting techniques such as breed improvement using AI, sex sorted semen, high quality feed, precision feeding practices, enhanced animal healthcare leveraging IoT to increase milk productivity.
- **Growing popularity of value-added dairy products:** With changing consumer preferences and increasing disposable incomes, there is a rising demand for products like ghee, butter yogurt, cheese etc. This trend presents significant opportunities for dairy farmers to diversify product offerings and increase income.
- **Shift towards organized retailing:** Large retail chains and dairy cooperatives are playing an increasingly important role in dairy and this shift has potential to bring in supply chain efficiencies and ensure better returns for dairy farmers.

There is a need to strengthen the dairy value chain right from quality feed, breed, processing, value addition to market linkages.

Role of Public, Private Sector and Dairy health

The dairy sector in India is characterized by a mix of production systems, ranging from traditional small-scale farms to large commercial dairy farms. Small-scale and marginal farmers account for majority of milk production in the country, with the average herd size being less than two animals. Government institutions like the NDDB and state dairy federations play a crucial role in research & development, providing technical support, training, and financial assistance to dairy farmers. In recent years, the private sector has emerged as a significant player in the dairy sector, investing in modern precision dairy farming practices, value-added products, and processing infrastructure. This has helped optimise resources, reduce costs, and bring supply chain efficiencies and improving productivity.

The health and nutrition of dairy animals are crucial for ensuring the quality and safety of dairy products. Proper nutrition, vaccination, and regular health check-ups are essential for maintaining the health and productivity of dairy animals. Governments, along with various dairy cooperatives and private companies, conduct regular health camps and awareness programs for dairy farmers, focusing on providing information and training on best practices for animal health and nutrition.

Government Programmes in the Sector

Government of India has taken significant initiatives to boost productivity, value addition and create employment and income generation opportunities for the farmers,

About the **AUTHOR**

Utsav Mishra,
Director, EY.

such as

- **National Animal Disease Control Program** launched in 2019, is the world's largest vaccination program and aims at making the country free from FMD and Brucellosis in livestock through mass vaccination, disease surveillance, and strengthening veterinary care.
- **Rashtriya Gokul Mission** focuses on conserving and improving the productivity of indigenous cattle breeds.
- **National livestock mission** aims to ensure quantitative and qualitative improvement in livestock production systems focussing on smaller ruminants through capacity building of stakeholders for breed improvement, feed and fodder development, livestock health, and entrepreneurship.
- **Fodder Development Scheme** aims to increase fodder production and availability by promoting scientific cultivation of fodder crops, pasture development, and establishment of silage units.
- Additionally, several state governments have implemented schemes to promote dairy sector, focusing on access to financial assistance, technical support, and training to dairy farmers.

Success Stories

The dairy processing industry has witnessed significant growth in recent years, driven by increasing demand for value-added dairy products. Notable success stories include:

Amul cooperative model, India

The Amul model has revolutionized the dairy industry empowering millions of dairy farmers and ensuring fair returns for their produce. Today, Amul is not only the largest dairy cooperative in India but also one of the largest dairy companies in the world. Over the years, Amul has developed wide range of value-added products ensuring higher margins, more than compensating for low margin products like milk and ensuring higher returns to the farmers.

Mother Dairy

Mother Dairy India established in 1974, has played a crucial role in providing safe and nutritious dairy products to consumers

across the country. The company has a strong focus on quality and safety again focussing on best-in-class dairy processing practices and value-added products.

Fonterra

New Zealand based Fonterra, is the world's largest exporter of dairy products and has established itself as a dairy success story with its global reach and innovative practices. Founded in 2001, Fonterra is a cooperative owned by around 10,000 New Zealand farmers and has expanded its operations to more than 140 countries. In 2020, Fonterra reported a total turnover of around NZD 20.1 billion, which is higher than the GDP of several small countries.

Way Forward

Strengthening cooperatives and increasing organized sector presence

In India, the liquid milk market is largely dominated by the unorganized sector. However, the organized sector has been able to reach around 40 percent and is increasing. Cooperatives constitute about 55-60 percent of the organized milk production and are present across the country. There is a need to strengthen the dairy value chain right from quality feed, breed, processing, value addition to market linkages. Cooperatives can be strengthened by such interventions and financial support to enhance productivity and livelihoods.

Becoming future-ready

India is largely a fodder-deficient country, so it is imperative to adopt modern precision dairy techniques, innovative practices, and new fodder crops to overcome this deficit and improve productivity and efficiency. This is especially crucial given the impending climate taxation, expected to come into effect in near future.

Waste to wealth

Capturing and recirculating the animal waste through creation of bio manure, bioCNG and other innovative products like biopaints etc., has potential to unlock more value and make dairy farming more lucrative while at the same time being climate friendly/ compliant.

Thinking out of the box

There is a need to explore new avenues in breeding to improve productivity while ensuring animals are suited to local conditions. A classic example is the Brazilian Gir, where Gir cows from India were imported by Brazil around 150 years ago and crossbred with Holstein Friesian, resulting in triple productivity. Improving productivity is vital to reducing the per-unit climate footprint.

Thinking global, acting local

The dairy farmers are typically paid based on the SNF content in the milk. Going purely by economics and scalability, it is prudent to focus on buffaloes which on average have higher milk productivity, SNF content and resilience to diseases.

Making dairy farming easy and lucrative

Encouraging the younger generation to take up dairy farming can only happen when it's made easier at the smallest level, ensuring a seamless value chain from the availability of quality protein rich feed and fodder to access to quality breeds, value addition, branding, and market linkages to the dairy farmers & businesses.

The dairy sector in India indeed plays a crucial role in providing nutrition, livelihoods, and income opportunities to millions of people. With the right policies and initiatives, the sector has the potential to further expand and contribute to the country's economic growth and development. By focusing on innovation, sustainability, and inclusivity, the Indian dairy sector can continue to thrive and meet the evolving needs of Indian and global consumers.

** Views are personal*

NUTRITION AND PRODUCTIVE DAIRY SYSTEMS

Advanced nutritional strategies in dairy management focus on incorporating feed additives such as enzymes, probiotics, and essential minerals to enhance dairy nutrition.

The dairy industry plays a pivotal role in global agriculture, serving as a primary source of food and income for millions of people worldwide. As the demand for dairy products continues to rise, the need for productive dairy systems becomes increasingly vital. These systems ensure that dairy farms not only meet the growing consumer demand but also operate sustainably and efficiently. Central to the success of these systems is proper nutrition. Nutritional management is key in maintaining the health and productivity of dairy cows, directly influencing milk yield and quality.

Nutritional Requirements at Different Stages Vary

Nutritional requirements for dairy cows vary significantly throughout their life stages, affecting their health, milk production, and reproductive performance. Throughout these stages, it's important to monitor and adjust the diet based on individual cow needs and environmental factors. Employing strategies like the Total Mixed Ration (TMR) can help in meeting these varied nutritional demands efficiently by ensuring cows receive a balanced intake of all required nutrients in every bite they consume.

About the AUTHOR

Kumar Ranjan,
CEO,
eFeed

Impact of Nutrition on Milk Production and Quality

Nutrition plays a crucial role in enhancing both the quantity and quality of milk produced by dairy cows. Providing adequate nutrition can lead to a significant increase in milk yield. For example, studies have shown that a well-balanced diet can boost milk production by up to 15%. The diet of dairy cows also affects the composition of the milk, particularly its fat and protein levels. Specific nutrients have a direct impact on milk quality. For instance, feeding cows selenium-enriched diets has been linked to improvements in the antioxidant quality of milk. Additionally, higher dietary protein levels can increase the protein content in milk, which is essential for cheese production and overall nutritional value. By optimizing the diet of dairy cows with these nutrients, farmers can produce higher quality milk that benefits both consumer health and dairy profitability.

Advanced Nutritional Strategies for Dairy Management

Advanced nutritional strategies in dairy management focus on incorporating feed additives such as enzymes, probiotics, and essential minerals to enhance dairy nutrition. Technol-

ogy plays a crucial role in optimizing these diets. With the use of data analytics and specialized software, farmers can formulate precise diets tailored to the specific needs of their dairy herds. This precision feeding approach not only improves the health and productivity of the animals but also reduces waste.

Precision feeding techniques are vital in dairy management, ensuring each animal receives an optimal diet tailored to its specific nutritional requirements. This approach maximizes feed efficiency, enhances milk production, and reduces environmental impact. Precision feeding works by utilizing advanced sensors and data analytics to monitor each cow's health, milk composition, and feed intake, adjusting rations in real-time based on this data.

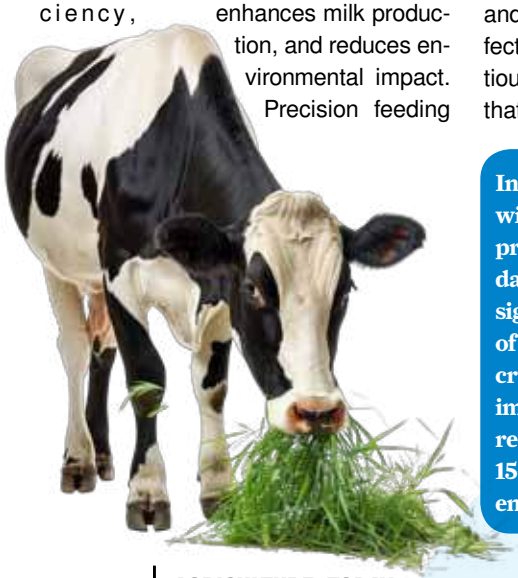
Additionally, managing mycotoxins—harmful substances produced by fungi in feed—is crucial. These toxins can impair animal health and reduce milk quality. By using precision feeding, farmers can better control feed quality and incorporate mycotoxin binders effectively, ensuring safer and more nutritious milk output. Studies have shown that precise diet formulations can lead to approx 10% increase in milk yield while decreasing feed costs by about 3% (Journal of Dairy Science, 2022).

Precision feeding in dairy cows is a strategic approach that significantly reduces methane emissions, a potent greenhouse gas.

Sustainable Practices in Dairy Nutrition

Precision feeding in dairy cows is a strategic approach that significantly reduces methane emissions, a potent greenhouse gas. This method involves tailoring the diet of cows based on their specific nutritional needs, which optimizes their digestive processes and improves feed efficiency. By carefully balancing the intake of proteins, carbohydrates, and fats, precision feeding minimizes the undigested feed that ferments in the cow's stomach, a process that typically produces methane. As a result, less methane is released into the atmosphere. Moreover, precision feeding enhances the overall health and productivity of the cows, making it a win-win for both farmers and the environment.

Nutrition is crucial in dairy farming, impacting cow health, milk yield, and quality. By employing balanced diets and advanced feeding strategies, farmers can optimize dairy production and sustainability. Implementing precision feeding and managing dietary components reduces environmental impacts and enhances profitability, making nutrition a cornerstone of successful dairy systems.



In India, a program was launched to provide smallholder farmers' livestock with balanced rations, aiming to meet their nutritional needs and enhance milk production. Livestock were categorized based on milk yield into low (<8 kg/day), medium (8-12 kg/day), and high (>12 kg/day) yielders. The study observed significant improvements in milk yield and milk fat content after the introduction of balanced rations. Additionally, feed conversion efficiency and rumen microbial crude protein synthesis both showed increases. The program also positively impacted the animals' health, increasing levels of plasma immunoglobulins and reducing parasitic loads. Notably, enteric methane emissions were reduced by 15-20%, demonstrating that balanced feeding can elevate productivity and environmental sustainability in dairy farming.

DAIRY CATTLE

INTERVENTION AS REHABILITATION

Adharshila for Sustainable Socio-Economic Transformation & Welfare (ASSET & W) is a not-for-profit organization has been dedicatedly working for small and marginal farmers in India since 2014 to enhance their income through sustainable agriculture and livestock-based livelihoods development. In alignment with the vision of Heifer International, its local extension ASSET & W has successfully intervened projects on small ruminants (goats and pigs) and backyard poultry value chains in Jharkhand, Rajasthan, Sikkim, and Uttar Pradesh. Recently the organization has begun a CSR funded dairy cattle distribution and development initiative in Bihar, Jharkhand, Odisha, and West Bengal to enhance farmers' income and food security as well as nutritional support through milk production at home.

About the **AUTHOR**

Dr. Abdus Sabur Sheikh,
Senior Program Manager,
Livestock Technology & One Health,
Passing Gifts (A Heifer International Initiative)

Capacity Building

ASSET & W's intervention strategy goes beyond simply distributing animals. It focuses on capacity building of farmers through Improved Animal Management (IAM) Trainings on how to select good-quality dairy cattle, better housing, strategic feeding, and preventive and primary healthcare including deworming and vaccinations, which equip them to adopt better husbandry care for their animals. This leads to ensure good health and well-being of animals as well as higher productivity and profitability.

ASSET & W is fostering relationship between the dairy farmers and the local government vets of Animal Husbandry Department (AHD) and Krishi Vigyan Kendra (KVK) for technical support and guidance. Recognizing the crucial role women play in dairy husbandry and family income generation, we prioritize initiatives that empower women to actively

participate in dairy farming activities.

Special Dairy Rehabilitation Project

In the wake of the devastating June 2023 Balasore train accident in Odisha, ASSET & W, with the support of CSR funds, identified 40 families among the most affected. These families not only grappled with immense personal loss but also faced the destruction of their livelihoods.

Determined to offer a lifeline, ASSET & W launched a special dairy rehabilitation project specifically designed for these families. This project perfectly exemplifies how ASSET & W's established intervention strategy can be adapted to address specific needs.

The project incorporates the core tenets of the intervention strategy those are distribution of dairy cattle to 40 families, providing them with the foundation for milk production and income generation; comprehensive Improved Animal Management (IAM) training sessions to equip families with the knowledge to properly care for their animals, ensuring their long-term success; and establishing connection between the farmers and local government vets of Animal Husbandry department and KVK for ongoing guidance and support.

The anticipated outcomes are increased income and improved livelihood of the families due to milk production from the dairy cattle and it will provide a steady source of income leading to greater financial stability for the families

Empowering the Vulnerable

This project is more than just an intervention of providing cows and buffaloes; it's about genuinely doing something for others at the time of their need for bouncing back and empowering the highly vulnerable and affected families who are in real need to rebuild their lives and secure a sustainable future. The anticipated outcomes are increased income and improved livelihood of the families due to milk production from the dairy cattle and it will provide a steady source of income leading to greater financial stability for the families; Knowledge gained from the IAM training will empower families to manage their livestock effectively and ensuring long-term success in dairy farming; building resilience and recovery from the shock due to the tragedy; and facilitate liaison of families with the local departments and will ensure access to expert advice and resources for veterinary healthcare.

By combining ASSET & W's established intervention strategy with the genuine needs of the families of Odisha train accident victims at the time of crisis, this intervention offers a beacon of hope to the families. On World Milk Day, we celebrate the power of collaboration, knowledge, and the indomitable human spirit in creating a brighter future.

ANIMAL NUTRITION FOR ENHANCING DAIRY PRODUCTION

The world's population is expected to reach 8.5 billion by 2030 and there are substantial challenges in ensuring access to food, shelter, and essential resources while safeguarding wildlife and ecosystem health. Amidst these challenges, dairy products play a vital role in providing nutrient-rich and calorie-dense sources of nutrition, underscoring the importance of animal nutrition.

Rising Global Dairy Requirement

Globally, milk production is anticipated to increase by 177 million tonnes by 2025, with an average annual growth rate of 18% over the next decade. It's estimated that over 80% (6 billion people) of the global population regularly consume liquid milk or other dairy products. Simultaneously, per capita consumption of dairy products is expected to rise between 0.8% -1.7% annually in developing nations and between 0.5% -1.1% in developed economies.

Among the 570 million farm holdings worldwide, over 150 million farmers, constituting one in four of these holdings, rear at least one milk-producing animal, including cows, buffaloes, goats, or sheep. So implementing a balanced diet tailored to meet the specific nutritional needs of dairy animals can lead to increased milk yield, enhanced milk quality, and greater profitability for dairy farmers.

Ensuring the inclusion of essential nutrients in the diet is critical for health and productivity of dairy animals.

Vitamins and Mineral Supplements

Ensuring the inclusion of essential nutrients in the diet is critical for health and productivity of dairy animals. Major minerals like calcium, phosphorus, magnesium, sodium, potassium, and chlorine play crucial roles in various physiological processes. Calcium deficiency, can result in conditions like rickets in young animals and osteomalacia in adults. Supplementation of major minerals can be achieved through various methods, including ground limestone, steamed bone meal, dicalcium phosphate, and incorporating green leafy crops, especially legumes.

Phosphorus is another essential mineral required for bone formation and energy metabolism, with inadequate phosphorus leading to poor bone development in young animals and decreased milk production in adults. Supplementation is typically carried out through feed additives such as dicalcium phosphate and monocalcium phosphate.

Microminerals, including iron, copper, zinc, manganese, cobalt, selenium, and fluorine, are necessary for enzyme function, immune system health, and overall well-being, often supplemented through mineral mixes or premixes in the diet. Vitamins like A, D, E, K, and C are crucial for various physiological functions, including vision, bone health, immunity, and reproduction, typically supplemented through vitamin-rich feedstuffs or commercial vitamin supplements.

Herbal Animal Nutrition

Harnessing the power of nature, medicinal plants offer multifaceted benefits as feed additives in animal production. For example, cinnamon, garlic, and ginger, contain active compounds with antimicrobial, antioxidant, anti-inflammatory, and immune-stimulating properties. Various studies demonstrate their efficacy in improving digestive health, reducing disease risk, and enhancing rumen microbial activity. Additionally they improve feed palatability, digestion and nutrient absorption, thereby boosting animal productivity. By carefully selecting and using these additives, producers can optimize animal performance while ensuring product quality.

Feeding Schedule Attuned to Stage of Lactation

For dry cows weighing 250, 300, or 350 kg, the recommended green grass quantities are 25, 30, or 35 kg, respectively, with no additional concentrate required for non-pregnant individuals. However, pregnant cows benefit from an extra 1.5

About the **AUTHOR**

Dr Ikshit Sharma
Director
Aimil Pharmaceuticals (India) Ltd

kg of concentrate from the 7th month of gestation, aiding in their nutritional needs during this critical period. For dry cows experiencing poor physical condition or low-quality fodder, up to 1 kg of concentrate can be provided to supplement their diet and maintain their health.

For milch cows of the same weight categories, the feeding regimen remains consistent with the green grass allocation and concentrates is determined by milk production. Dairy cows are advised to receive 1 kg of concentrate /2.5 kg of milk produced, assuming an average 4% fat content. Buffaloes, on the other hand, require 1 kg of concentrate /2.0 kg of milk. This systematic approach to feeding management ensures that cattle receive the necessary nutrients at each stage of lactation, optimizing their health, productivity, and overall well-being.

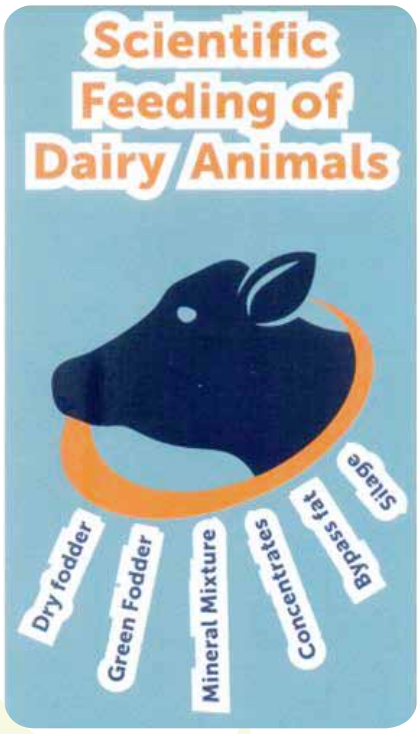
Enteric coating (EC) for Enhanced Efficacy

In animal nutrition EC optimizes nutrient absorption by shielding supplements/ medications from stomach acid, preventing premature degradation, ensures intact delivery to the intestinal tract, where absorption rates are higher and enhances bioavailability, maximizing nutrient utilization. Additionally, EC minimizes stomach irritation, promoting comfort during digestion and contributing to improved nutrition, health, and overall well-being.

Government Initiatives

These initiatives in livestock management encompass both proactive and responsive measures like:

Animal Health Support System for One Health: The National Livestock Mission, by Department of Animal Husbandry & Dairying in India, aims to enhance per-animal productivity by improving breeds, boost meat, egg, goat milk, and fodder production and reduce demand for fodder by strengthening the supply chain for certified fodder seeds. It promotes the establishment of fodder processing units to bridge the demand-supply gap.



*ICAR –Krishi Vigyan Kendra,North Goa

Harnessing the power of nature, medicinal plants offer multifaceted benefits as feed additives in animal production.

Accredited Agent for Health and Extension of Livestock Production (A-HELP): This worker will be the first port of call for any health-related demands of livestock population of that village.

Mobile Veterinary Units (MVUs): These are customized fabricated vehicles for veterinary healthcare with equipment for diagnosis, treatment & minor surgery, audio visual aids and other basic requirements for treatment of animals.

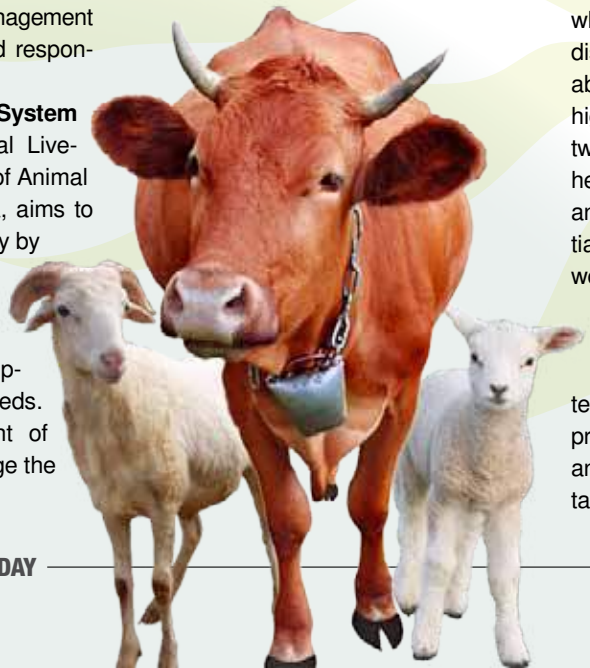
"Integrating concentrates with roughages -Layering grain atop silage, boosts milk fat percentage, while mixed feeding fosters balanced rumen function"

This technique, optimizes rumen fermentation, enhancing nutrient utilization and drives the development of complete feeds, merging roughages and concentrates in precise ratios to form exclusive dietary sources for animals. Complete diets prevent selective eating, ensuring consistent nutrient intake. Employing group feeding under this system minimizes dietary formulation adjustments based on milk yield fluctuations.

Ecological Dynamics

Ecological factors like grazing and plastic pollution profoundly impact animal nutrition. Grazing behaviour influences dietary choices, with animals selectively foraging based on available vegetation. Meanwhile, plastic pollution in ecosystems can disrupt food chains, affecting the availability and quality of food sources, thus highlighting the intricate relationship between environmental factors and animal health in natural habitats. Understanding and mitigating these impacts are essential for promoting optimal nutrition and well-being in wildlife population.

By embracing holistic approaches, incorporating herbal extracts, and leveraging innovative techniques like enteric coating, dairy farmers can optimize production efficiency while prioritizing animal welfare and environmental sustainability.



ENHANCING DAIRY PRODUCTION THROUGH DIGITIZATION

India stands as a global leader in both milk production and consumption, with projections indicating continued growth. However, despite this promising outlook, challenges persist. These challenges stem from factors such as the predominance of small-scale farming, limited access to technical knowledge, low-yielding cattle breeds, inadequate infrastructure, seasonal variations, and market limitations. Addressing these challenges is crucial to achieving India's milk production targets of one-third of the global milk production by 2030.

Digitization emerges as a pivotal solution to overcome these obstacles. By leveraging digital technologies, the dairy sector can enhance farm productivity, milk procurement, supply chain transparency, and value-added processing. However, the unorganized nature of India's dairy industry impedes technology adoption, leading to high wastage and quality issues. Approximately 3% of milk is wasted each year in India, while over half of the country's milk industry is managed by the unorganized sector.

OPTIMIZING MILK PRODUCTION WITH DIGITAL SOLUTIONS

Smart Farming Technologies

Dairy farmers in India encounter significant hurdles such as prolonged intercalving intervals, insufficient grasp of nutrition management, and limited access to quality veterinary services, all impeding milk production. The average milk yield of cows in India are significantly lower compared to those in developed countries. The National Dairy Development Board (NDDB) is prioritizing efforts in breeding, nutrition, and animal health to meet milk production targets.

Cattle management is a crucial aspect of dairy farming, where digital solutions

By leveraging digital technologies, the dairy sector can enhance farm productivity, milk procurement, supply chain transparency, and value-added processing.

play a vital role. Internet of Things (IoT) devices empower farmers to monitor and manage their livestock effectively, providing insights into health, behaviour and productivity. Stellapps has developed an AI-driven wearable device called the mooON, along with a complementary app. The mooON device acts as a cattle pedometer, detecting heat cycles based on activity patterns, while the app delivers real-time alerts on behaviour, personalized nutrition advice, and comprehensive data management. Stellapps Farm Improvement Service (FIS) team, comprising veterinary professionals and para veterinarians utilizes the mooON device and app to record and analyse cattle parameters, provide tailored guidance to enhance dairy farming practices. The implementation of these innovative solutions has led to improvements in milk quality and yield, reduced intercalving periods through AI-assisted heat detection for artificial insemination, and significant reductions in cattle health and administrative expenses, in our operational areas.

Access to Information and Advisory Services

Access to Information and advisory services for farmers is crucial for achieving optimal milk production. However, in rural areas, obstacles such as inadequate infrastructure, low literacy rates, and limited access to information pose significant challenges. Digital platforms, mobile apps, and dairy-tech startups provide real-time dairy information and expert advice, aiding informed decisions on feed, breeding, disease control, and markets. Stellapps offers advisory via its field team, social media, and SmartFarms app, streamlining tasks, offering Milk-Passbook, Payment-Passbook, and advisory. This enables

About the **AUTHORS**

Dr.Sukesh S, Strategic Program Manager - Farm Improvement Services and Abhishek Chaudhary Program Manager, Stellappas

farmers to monitor milk quality, track payments, and manage finances conveniently, enhancing transparency and efficiency.

Supply Chain Optimization

Following milking, collected milk faces challenges during transportation to collection centres, including data inaccuracies, adulteration risks, and limited analytics. Digital platforms streamline the supply chain by enabling direct communication between stakeholders, enhancing transparency and efficiency. Solutions like online procurement systems and blockchain-based traceability improve trust in the dairy value chain. Stellapps SmartAMCU revolutionizes milk procurement by enhancing efficiency and transparency. Controlled by an Android IoT device, it acts as an Automatic Milk Collection Unit, facilitating real-time data acquisition and sharing. Integrated with smartCC and procurement ERP, it ensures smooth operations and transparent transactions, farmers can be motivated to increase production while maintaining milk quality and avoiding adulteration.

Quality Assurance and Traceability

The short shelf life of milk poses preservation challenges in India, exacerbated by inadequate transportation infrastructure and limited refrigeration and storage facilities. Insufficient cold chain infrastructure, particularly in high-temperature regions, further exacerbates these issues, limiting farmer's milk production potential. Blockchain technology provides a solution by establishing transparent records of milk production, processing, and distribution, boosting food safety and consumer confidence. Stellapps utilizes IoT devices and data analytics to monitor the entire milk journey, ensuring transparency and quality assurance from farm to table.

Chilling milk at aggregation points is crucial, especially in rural areas with unreliable electricity. Our ConTrak solution monitors chilling processes in real-time, preventing quality deterioration and fostering transparency in compensation based on milk quality. Enhanced quality

Digital platforms streamline the supply chain by enabling direct communication between stakeholders, enhancing transparency and efficiency.

reduces adulteration risks and fosters fair pricing agreements with farmers, thereby encouraging increased milk production.

Market Access and Financial Inclusion

In India, farmers face financial hurdles in dairying, often resorting to high-interest informal lending. Digital platforms like e-commerce and mobile payments will encourage farmers to increase milk production by broadening market access, aiding in price negotiation, and ensuring prompt payments, thus promoting financial inclusion and rural economic empowerment. Stellapps mooPay platform addresses these challenges by offering cattle loans, insurance, and connecting farmers with bank-offered financial products, fostering transparency and financial independence. By integrating banking APIs and facilitating direct payments, Stellapps enhances farmer financial security and establishes a robust financial record, facilitating credit access and ensuring long-term financial stability.

In conclusion, the Indian dairy sector faces myriad of challenges that hinder its growth and competitiveness in the global market. However, with the advent of digital technologies and innovative solutions, there is tremendous potential to overcome these challenges and unleash the sector's full potential. By embracing digitization, India can transform its dairy industry into a modern, efficient, and sustainable powerhouse, driving economic growth, rural development, and food security for generations to come.

About the AUTHOR

Dr Harinder Singh,
Excellent Enterprises Pvt Ltd.

Commercial Fodder Processing

NEXT GAME CHANGER FOR INDIAN DAIRY SECTOR

Fodder and nutrition alone constitute 60-70% of the total cost of any successful dairy farm. Introduction of commercially processed fodders (as silage, hays, TMR's, treated straws etc) not only saves big input cost in a year, but also offers better nutrition economically with better milk yield, SNF & other animal performance parameters. For 2-4-6 liter milk animals, routine diets are fine. But when it comes to high yielding animals with milk potential of 15-20-25 liter, pre-digested, enriched fodders in the form of hays, silages, enriched straws etc. are required. This presents an opportunity which needs to be attended to on priority.

Most of commercial & developed dairy farms in Punjab & other parts of India have shifted to processed fodder-based nutrition

We need to avoid chara-ghotalas with dairy animals through green fodders stuffed with more DM, protein etc for quality & economical milk production. Instead of feeding 70-80% water through fresh fodders, we are keeping our animals devoid of DM, proteins, carbohydrates etc thus forcing them to underperform in terms of milk yield, milk solids, conception rate, intercalving period & other body functions. In good dairy farming, balanced & economical feeding & scientific nutrition is the game, rest are fairy tales.

Shift to Processed Fodder

Most of commercial & developed dairy farms in Punjab & other parts of India have

shifted to processed fodder-based nutrition. Increasing costs of various inputs, mainly feeds, ingredients has also forced dairy community to shift to more economical & convenient options like processed fodders. Commercially processed fodders not only offer us food security for our animals round the year, against drought, floods, snow, earthquakes etc but also helps in saving big on transport, labour, storage & serving (to the animals).

During the last about 18-20 years, we have shown how the challenge of fodder availability has been turned into big business opportunity, not only for entrepreneurs, companies or start ups but also for many FPOs, MPCs, dairy farmers, milk plants, cooperatives etc.

Financial crises, repeated crop failures, flood, drought, climate change etc., in India will force the common farmers to opt for more secure, financially viable agri-options/ ventures. Here commercial fodder processing has come up as the blessing with good returns.

Make Hay While the Sun Shines

The Sun rarely shines in most of dairy developed countries of EU, US etc but they make good business out of it, not only with their own consumption at dairy farms but also through exports. On the other hand in India, where Sun shines for most of the year, fodder is being projected as deficit (with even no exports), in the absence of any post-harvest processing industry here. So fodder processing should not get limited to bale silage production, but also should be considered for commercial hay production which is a much bigger industry worldwide, with more options for exports.

States having sufficient or surplus fodders should consider commercial fodder processing on priority. Like a small state of Punjab with surplus fodder has now approximately 350 commercial fodder processing units supplying around half of its produce to neighboring states of JK, HP, Uttarakhand, Rajasthan, Gujarat etc.

Business Opportunities

Deficits of fodders, straws etc in the country can be countered well with setting up of commercial fodder processing, more economically, as we have all-weather fodders in the country & even burning straws in some states. So this challenge can be converted into big business opportunity with post-harvest fodder processing in the country.

There is sufficient demand-production gap (of fodders, straws) in the country, as fodders are seasonal, with no shelf life, storage or transport systems.

There is sufficient demand-production gap (of fodders, straws) in the country, as fodders are seasonal, with no shelf life, storage or transport systems. Even fodder crops, like any other, are available for a few days or even weeks. So processing fodders during peak & selling round the year generates good business, growth opportunities, rural employment, dairy development with more secure social & economical development & food security.

Availability of excessive of raw materials (green fodders, straws, by-products like leaves, agro-industrial wastes etc) at reasonable prices in many parts of the country & demand at the front end offer ample opportunities to consider for such secure ventures. Also, post-harvest commercial fodder processing will help greatly to balance geographic imbalances between fodder-sufficient areas & fodder deficient areas. Incentives, subsidies etc., by Central Govt under NLM, AIF, fodder-based FPO's by NDDB etc. and various state funding schemes by Departments of AH, DDBs offer ample opportunities to jump into this fast growing segment.

Lot of export demand in Gulf, SE Asia etc. can be explored with good margin gaps. Many Gulf countries don't have fodders, they depend on imports (mainly hays) and are exporting milk, milk products to earn foreign revenue.

Based on AI & other statistics, the Central Govt is considering on priority to set up Fodder Banks/ buffers in various regions facing frequent droughts, floods, snow, crop failures etc, but is not finding enough fodder processing units who may supply bulks to such fodder banks/ buffers.

AGRICULTURE TODAY GROUP

15TH AGRICULTURE LEADERSHIP CONCLAVE 2024

10 -11 JULY 2024 | Holiday Inn @ Aerocity, New Delhi





Navigating Agriculture through Climate Challenge

FOR MORE DETAILS, PLEASE CONTACT

Ms. Zaman Almas, Business Manager
Mobile : +91 – 7290088228
zaman.almas@agriculturetoday.in

Dr. Mona Singh, Editor & CEO
Mobile : +91 – 7290031468
mona.singh@agriculturetoday.in

www.agriculturetoday.in/conclave

OPTIMUM ANIMAL NUTRITION MANAGEMENT FOR EFFICIENT DAIRY PRODUCTION

As India continues to lead the world in dairy production, the optimization of animal nutrition emerges as a pivotal pathway for further advancement. By prioritizing balanced diets, innovative feeding approaches, and sustainable practices, the dairy sector can unlock its full potential, ensuring a prosperous future for both farmers and consumers alike. Animal Diet and its nutritional value not only impact the animal's health but also the farmer's income as the milk quality and quantity depend on the feed. Dairy Farmers need to keep proper information and be trained on how they can increase their cattle nutrition with limited resources and proper ration balancing.

Success Story

Cattle of Asha Rupi Devi from Reoder Area, Sirohi were not healthy less productive. Her cattle did not receive a proper diet and ration as per their need and requirements. The milk quantity was not good and it was low in Fat & SNF. This impacted her dairy income and her expenses on cattle were increasing. But after she joined Asha MPC as a member, she underwent various training programs. After getting these training & using products of Asha, the milk volume increased and she has seen a positive change in dairy income and milk volume.

Asha Mahila Milk Producer Company

Incorporated in Pali, Rajasthan on 21st March 2016 as a Producer Company, Asha Mahila Milk Producer Company Limited was established with the financial support of DHANII (Dairy Health and Nutrition Initiative of India Foundation), Tata Trusts Dairy Mission and Technical support of NDDB Dairy Services and to provide livelihood to rural women by setting up a transparent Milk Procurement System and providing Technical Input Services.

For dairy farmers, it is important to have good quality and quantity of milk to be financially dependent on their cattle.

Asha is helping around 37000 Dairy women farmers and other non-members of the company to maintain the diet and health of their Cattle with their efforts & products.

To enhance nutrition among dairy cattle, better diets at lesser cost is important. Asha is working in 10 districts in Rajasthan where they offer region-specific products & help their women members to achieve good health of their dairy animals and high yield of milk production. Asha is helping around 37000 Dairy women farmers and other non-members of the company to maintain the diet and health of their Cattle with their efforts & products.

About the **AUTHOR**

Komal Menaria, Asha Mahila Milk Producer Company

Asha MPC's Products

Asha provides different types of services and products to its members & non-members in Rajasthan districts so that their cattle can have proper nutrition.

The important products are Asha Cattle Feed, Asha Mineral Mixture & Block, Asha Calcium, Mitha Soda (to enhance animal digestion) and Asha Rock Salt (for the main summer to increase their water intake so that they can be properly hydrated and milk volume can increase).

Services to Enhance Animal Diet & Nutrients

Ration Balancing Program (RBP) helps to maintain proper diet of their cattle according to their region & animal (Cow & buffalo). Their dairy management training helps to enhance milk volume by ensuring good cattle health and or proper vaccination. AI (Artificial Insemination) is also provided by Asha Staff through trained qualified AI Technicians at the doorstep of farmers and maximize farmers' income in its operational area by improving the breed of cattle.

Through silage demonstration, Asha helps farmers to use their extra green feed to make silage so that farmers can afford proper food for animals during summers also. Besides that they prodvide chaff cutter which can help increase the digestion of cattle.

POOLANI MILK COOPERATIVE SOCIETY [PMCS] TRANSFORMING MELOOR

Dairy farming has become the primary source of revenue among farmers of Meloor panchayat n Thrissur District of Kerala. What started with 30 members in 1976, today has 1368 members and can handle 2250 litres of milk per day as of 2012. Poolani Milk Cooperative Society has successfully integrated improved technology and management into the conventional small milk producer production system, making significant improvements to Dairy Sector of Meloor Village. In the hamlet, it directly and indirectly supports 2000 people, and it gives its members about Rs 25 lakhs each month.

Quality Assurance

Certified to ISO 9001:2015 and ISO 2200:2005, PMCS strictly adheres to quality of milk and milk products in accordance with the standards of the Kerala Co-operative Milk Marketing Federation (KCMMF), also known as Milma, and the National Dairy Development Board [NDDB]. PMCS has one main centre with a chilling plant at Poolani and two sub centres at Adichili and Pusphagari. Utilising the MILKO Tester and an automated milk collecting unit (AMCU), the quality measurement is carried out scientifically. The MILKO Tester aids in the quick determination of the milk's fat percentage, and the AMCU shortens farmers' waiting times and eliminates unfair practises. By the conclusion of every 10 days, the cashier settles the account and transfers money into shareholders' account after inputting the milk measurement twice every day. To increase livestock output and productivity in the village, veterinarians perform regular checkups and offer high-quality animal health services, including technological input services such as animal health care, artificial insemination services, immunisation, and the provision of balanced cow feed.

PMCS is the largest milk supplier of milk in Ernakulam Regional Co-operative Milk Producers' Union Ltd.

About the **AUTHOR**

Dr Sreeni K R,
Amrita Vishwa Vidyapeetham
Kerala

Financial Empowerment

Meloor produces enough milk on its own. According to instructions from KCMMF and NDDB, PMCS assists farmers in price negotiations and the assembly or marketing of milk and dairy products to wholesalers and retailers. The sector plays a crucial role in achieving food security, reducing village poverty, generating employment opportunities for women, and providing a regular source of income. It also promotes sustainable agriculture practices, and contributes to

Milma provides free insurance plans, discounted veterinary services, pension plans, free housing to a select group of farmers each year, help finding milch cows, discounted feeds, and other services. In accordance with several programs, the animal husbandry department offers dairy farmers a subsidy of Rs. 3 lakh as part of the Milkshed Development Programmes, as well as a 50-percentage subsidy for the purchase of cows, incentives throughout the summer, and incentives to grow fodder in and above 50 cents. government is offering free labour and seeds. Farmers get subsidies from the zilla panchayat, block, and gram panchayath.

the overall economic development of rural areas.

Equal pay for men and women is guaranteed. By providing jobs for women, PMCS has significantly contributed to the economic empowerment of women and laid the foundation for increased independence and self-esteem.

Governing Body

Every five year, elections are held to choose the director board members, and the president is chosen by the nine members that make up the membership. The president and the elected members are present during every ordinary meeting. The reports must be delivered to NDDB and Milma. The administrative team organises a number of social programs, including pensions and subsidies for livestock feed, among others. The President, Shri N G Sathish Kumar, and Secretary, Smt. P P Jalaga and other elected members, now set the standards for PMCS in terms of how to handle farmers, employees, suppliers, customers, and other stakeholders. The PMCS built an APCOS hall to hold meetings in addition the unit gives pensions to 86 members.

Feed and Fodder

PMCS is pushing people to plant more varieties of grasses and giving out free seeds to plant different types of fodder such as Bajra Napier (Co-4), Guinea grass (Anjan grass), Fodder sorghum (CoFS-27), Multi cut fodder sorghum (CoFS-29), African tall maize, Legumes, Cowpea, and tree fodder variants Sesbania and Glyricidia.. Due to the recent increase in feed prices, dairy farming has become less profitable and more burdensome for the common dairy farmer.

The average price of feeds is between Rs 1560 and Rs 1600 for a 50 kg bag. 10 to 12 kg of are consumed daily by single cow.

They have also opened a little shop where they sell all value-added products including cheese, paneer, ice-cream, biscuits and ghee rusks. PMCS is the largest milk supplier of milk in Ernakulam Regional Co-operative Milk Producers' Union Ltd.

Collaboration with Customers is Key

IRAC (Insecticide Resistance Action Committee)group 36 represents the category of insecticides with no known cross-resistance with existing products, thus making it a superior insecticide resistance management tool. Efficon®, newly launched by BASF in India holds the distinction of being the only insecticide in the category currently. During ist Launch, Anjana Nair, Group Editor, Agriculture Today had a detailed discussion with Dr. Marko Grozdanovic, Senior Vice President Global Strategic Marketing, BASF Agricultural Solutions business; Simone Barg, Senior Vice President, Agricultural Solutions Asia Pacific BASF and Giridhar Ranuva , Business Director, BASF Agricultural Solutions, India on the commitment of the organization for the safety and sustenance of farmers across the globe. Excerpts from the conversation....

In today's world, there are a lot of concerns surrounding chemical pesticides and sustainability. How does BASF plan to navigate through these fears?

Marko Grozdanovic : Our mission has been to create everything we can for a sustainable future in agriculture. We want to produce safe and sustainable, food and feed. Our products are strictly committed to the rules and regulations. We also have programmes, here in India too, that propagate the safe ways to use our products. We provide them with equipment that protect them from harmful exposure to products. When it comes to chemicals, we follow a risk based approach, where we assess not just the hazard but also the exposure. Not only we try to minimize the exposure but make sure that they are safely used. We also complement our chemical portfolio with new technologies such as seeds and traits and biologicals which are part of measures of our sustainable offering.

What are the programmes of BASF in India to ensure the chemical products are used safely?

Giridhara Ranuva : Safety, stewardship and sustainability are at the core of what we do in BASF. We are committed in ensuring that the farmers are completely aware of how to use the products and how to protect themselves in case of exposure. Through our programme, '**Suraksha Hamesha'**, we hold meetings with farmers where we discuss 9 ways of responsible use of crop protection chemicals. This starts from the time they go to the retailer to buy our products and include how they handle and prepare the stock solution, spray, clean themselves after and dispose the pesticide containers. We also educate women farmers and school students. Last year , we reached out to 8 million farmers in India and sensitized them about safety. We also have developed safety kits to be worn while handling pesticides keeping in mind the climatic conditions of India. These kits are made available to farmers at cost level. We collaborate with state governments also in the safety programmes.

How significant a market is India for BASF?

Marko Grozdanovic **:** Globally, India is one of the key markets and in Asia , India is one of the biggest markets and that is why a lot of our innovation and investments go into India. For instance, Indian is one of the first countries, where Efficon

is introduced. We are investing heavily on chemical side, seed side, trade and technology side for solutions in this very important market.

***Giridhara Ranuva* :** By 2030, India aims to be the biggest economy. Fifty percent of Indian population is directly or indirectly involved in agriculture and 15% GDP comes from agriculture. From economy perspective, BASF strongly believes that India is one of the important countries. We have been consistently investing in India over a long period of time. In the last six years, we have launched 9 new products, Efficon being the latest ones. We have two more launches lined up. In 2018, BASF entered into vegetable seeds with Nunhams. We have significantly invested in digital technology through which we issue advisories to farmers.

What makes Efficon different?

Giridhara Ranuva : India is an important cotton and vegetable producer. Thirty percent of losses in cotton and vegetables is due to sucking pests. Over a period of time, we have seen emergence of pesticide resistance. Efficon is based on Axalion® active ingredient and is classified under the new IRAC group 36 which represents a totally new class of insecticides (Group 36 — pyridazine) which has no known cross-resistance with existing products in the market, making it a superior insecticide resistance management tool. It is the only product in that group. It is very effective against jassids, aphid and white fly. Its effect starts from 2 hours itself and is highly safe on beneficial insects. It can work up to 12-14 days under favourable conditions.

Climate change and sustainability are today central to any key innovation in agriculture. How well is BASF attuned to this?

Simone Barg : BASF is deeply rooted in creating chemistries with sustainable future. We have a very strong Sustainability Leadership and transformation principles. We have already given ourselves the target of Net Zero by 2050 and we have one of the first two declaratives also meaning

tête-à-tête with Anjana

under 2030 we will reduce the amount of emission while increasing the volumes of chemicals that are required. This requires a big transformation which is dependent on R&D. We have started to emphasize on renewables. We are the first ones to have carbon footprint per product, because once we measure it, we can do something about it. In agriculture, we have sustainability commitments. We want to reduce 30% of carbon emissions on the crops that are produced and we want to bring in the technology solutions for the same.

Marko Grozdanovic : Climate change has resulted in the emergence of new pests and diseases, and pest resistance. We watch the markets closely and our new products are designed to address these challenges. In seeds and trait business, we also look into different traits such as better drought resistance and water productivity. In India with rice, we have technologies that help in transformation towards DSR , where there is less water consumption and less GHG emissions.

Today there is a lot of emphasis on natural and organic farming. Do you think it is a viable format for ensuring global food security?

Simone Barg *:* Customer can choose. Agriculture is diverse. There is space for everything. We are embracing all technologies. We have solutions for organic practices as well. These are complementary elements. As you know 30-40% of yield is lost to pest and diseases. This is a significant number considering the amount of resources that we invest in. If we switch to organic practices completely, this number is bound to increase, twice or beyond . Instead of choosing one over the other, we have to see how we can do sustainable practices, protecting the yield, health and resources. Again, consumers can choose. There will be a market for this. We have to look forward for co-existence.

Marko Grozdanovic **:** It is about finding the right balance between different technologies. Biological sustainable products are there, but it need to be effective and affordable.

AI-ACCELERATED RESEARCH TO DRIVE AGRICULTURE PRODUCTIVITY

India's agricultural sector is a cornerstone of global food security, significantly impacting world food supply and prices. It not only feeds India's vast population but also employs millions , making it one of the largest sectors in the nation. As we progress into a future where sustainable agriculture becomes increasingly critical, the role of Indian agriculture cannot be overstated. It is essential not only for domestic economic stability but also for global food markets.

Persistent Challenges and the Need for Modernization

Despite its pivotal role, Indian agriculture faces a productivity gap when compared to global standards. This disparity is primarily due to traditional farming practices that haven't integrated modern technologies at a pace seen in other countries. Indian farmers, many of whom are smallholders, face low incomes, sustainability issues, and challenges like water scarcity and soil degradation. These issues collectively contribute to the urgency for transformative solutions that can increase both yield and profitability.

AI technologies enable the creation of "digital twins " for farms, a digital representation of the farm with details about the crop, soil, weather, etc., which can simulate various environmental conditions and their impact on crop yield.

Tailored Research for Diverse Agricultural Needs

India's diverse agro-climatic zones present unique challenges that require equally distinct solutions. The agricultural demands of the arid regions of Rajasthan differ vastly from the humid and tropical conditions of Kerala. This diver-

About the **AUTHOR**

Ranveer Chandra, Managing Director, Research for Industry, CTO Agri-Food, Microsoft

sity necessitates targeted research efforts dedicated to understanding and addressing the specific needs of different regions, whether it's crop variety, pest management, or irrigation practices.

The Promise of AI in Agricultural Research

Traditional R&D methods, while foundational, are no longer sufficient to meet the accelerating demands of India's agricultural sector. There is a compelling need to embrace Artificial Intelligence (AI) in agricultural research and development. AI offers unprecedented capabilities in data processing and analysis, providing insights that can significantly enhance decision-making and innovation in agriculture.

Revolutionizing Agriculture with AI-Driven Tools

Developing Advanced AI Tools for Agriculture: The integration of AI tools such as chatbots, AI copilots, and multimodal AI systems can transform the agricultural landscape. These technologies can provide real-time assistance and insights to farmers, addressing issues like crop health, soil conditions, and market prices. For example, AI-driven chatbots, such as the ITC Copilot built using Microsoft Copilot Templates, can generate responses in local languages, offering tailored advice to farmers based on their specific conditions and needs.

Enhancing Data Integration: Multimodal AI can integrate data from diverse sources such as satellite imagery, Internet of Things (IoT) devices in the field, and historical agricultural data. This comprehensive data integration can lead to more precise predictions and recommendations, thus enhancing overall farm productivity. For instance, Andrew Nelson, a farmer in eastern Washington state in the US, who embraced AI and precision farming. The key lies in aggregating and analysing data sources across the entire farm. Collecting data from sensors, drones, weather stations, satellites, and beyond provides invaluable insights for farmers for informed decision-making. By leveraging data to support decisions on irrigation, fertilisation, and chemical application, Nelson reduced chemical usage by a staggering 35%, while simultaneously increasing crop yield and sustainability.

The integration of AI technologies in agricultural research and development can lead to substantial gains in productivity, sustainability, and global food security.

Accelerating R&D with AI Innovations

Simulation and Digital Twins: AI technologies enable the creation of "digital twins " for farms, a digital representation of the farm with details about the crop, soil, weather, etc., which can simulate various environmental conditions and their impact on crop yield. This allows for virtual experimentation and scenario testing without the cost and time associated with traditional field trials.

Crop Protection through AI: AI can accelerate the development of sustainable crop protection chemicals. Using advanced AI models, researchers can screen new chemicals, predict the effectiveness and environmental impact of potential new products, speeding up their development and regulatory approval.

AI for Crop Resilience: AI's capability to analyze genetic data enables the rapid identification of desirable plant traits. This can accelerate the breeding process, allowing for the development of crop varieties that are more resistant to diseases and better suited to specific environmental conditions.

Automated Phenotyping: AI applications extend to phenotyping, where computer vision and machine learning are used to analyze crop images systematically. This technology allows for continuous monitoring of crop growth and health, providing data that can improve breeding and management practices.

A Roadmap for AI Integration in Indian Agriculture

To harness the full potential of AI in agriculture, India needs a concerted effort to foster interdisciplinary collaborations that blend computer science with agricultural sciences. Additionally, a robust framework for data collection and analysis is crucial, as the success of AI applications heavily depends on the quality and breadth of the data available.

A Future Fueled by AI

As we look to the future, AI stands out as a key enabler in transforming Indian agriculture. The integration of AI technologies in agricultural research and development can lead to substantial gains in productivity, sustainability, and global food security. By promoting a culture of innovation and collaboration, India can not only solve its agricultural challenges but also lead the way in feeding a growing global population sustainably.

By integrating these cutting-edge technologies and fostering an environment conducive to digital agriculture, India can set a new global standard in agricultural productivity and sustainability. The journey of integrating AI into the fabric of Indian agriculture is poised to redefine the sector, paving the way for a future where technology and tradition create a synergistic impact on global food security.

ORGANISED CREDIT HELPS DEVELOP CREDIT NORMS

"Digitised processes are in a state of infancy in our country. This is to an extent due to absence of bandwidth of network and branch reach to the last mile apart from the still developing digital frameworks. However, a lot of promising activities have already started", says B S Sivakumar, President & Business Head - Agri Finance, Kotak Mahindra Bank Ltd. in an interview with Agriculture Today. Excerpts from the interview..

Farmers need to be educated on the breakeven concept of cost of inputs and the cost of output in the market place

What is the importance of credit in fostering agriculture and rural development?

In India agriculture has been given more of a status of sustenance rather than an income generating activity. This has prevented modernization of the activity, prevented improvement in productivity and yield per acre of land and prevented a planned increase of output of crops in demand. All these factors have ensured that credit lending to this sector was perceived as high risk. Further the loan waivers, non-applicability of SARFAESI act also limited credit interest in this sector from organized players except due to the pressure of priority sector lending. The participation of organized credit will infuse credit norms, educate farmers the need to improve their credit rating for further finances, help create assets linked to the agri value chain and importantly reduce the cost of credit to farmers, who traditionally have been forced into debt by unorganized high cost loans. As the rural economies are closely impacted by the performance of agriculture, fostering credit to this sector also impacts rural economies.

How can organised credit help in creating the much-needed Agri infrastructure?

Organised credit helps develop credit norms for viable agriculture activity. Farmers need to be educated on the breakeven concept of cost of inputs and the cost of output in the market place. Credit facilities like pledge financing allow farmers to hold their output for longer periods and sell when the prices improve a few months after the harvest season rather than distress selling post-harvest. Lenders also become a route for fair distribution of the government grants / subsidy schemes to benefit actual projects rather than loss of the funds through middlemen. Organised Agri credit also helps device schemes for asset creation by farmers.

How has digitization influenced agricultural credit in India?

Using apps and UPI devices and the Aadhaar framework, KYC authentication and linkage of Agri lands is now possible. In the near term, it will also eliminate the existing large scale multiple funding on the same Agri land. Digital lending mechanisms also help develop efficient farmer reach, execute digital loan documentation and ensure direct account transfer that eliminate frauds and short funding that cash based lending historically had the risk of. The satellite database of farmland and the mapping of farming areas ensure geotagging and creates data on crop cycle, intensity of farming and helps create information of crop losses and maturity of crops that help lenders undertake recovery in time.

Which are the financial products that you consider has potential to change the agriculture landscape of the country?

The promising good financial products include Agri Infra lending for creating assets like small warehouses, drip and tubewell irrigation loans that ensure water availability and efficient water use and lending for multiple and intensive

> As the rural economies are closely impacted by the performance of agriculture, fostering credit to this sector also impacts rural economies

cropping that integrate traditional crops with horticulture and ensure better yields per acre. With the progressive reduction in land acreage held by farmers, the only choice for farmers is to take up greenhouse cultivation for high value output of horticulture crops. Funding for dual activities like freshwater fishing / dairy / poultry coupled with agriculture that uses the waste output from the fishery/ dairy / poultry activities helps to enrich the soil.

Which are the new products introduced in the Agri - finance sector by Kotak Mahindra Bank?

Our lending activities like Agri project loans, warehouse finance, tractor and Agri implement funding focus on asset creation that improve the net worth of farmers. Over the years the bank has simultaneously focused on the growth of the Agri SME and the Agri micro credit segments. Funding was focused to agro processing and value chain participants including individuals and enterprises. We as a bank went into key semi urban Agri markets and processing centers to meet the needs of the Agri participants in the value chain - be it farm gate traders, primary and secondary food and agro processors. Simultaneously, using digital mechanisms, we have also focused on lending very small ticket loans to individual farmers and ladies who take up activities like dairy & goat rearing activities.

What policy level changes would you suggest to improve the Agri credit situation in India?

Rules that allow for: consolidation of Agri lands, taking Agri lands on formal short term-lease with an employment guarantee to the land owning farmer; Income sharing arrangements with farmers to allow organized farming ; Organized direct buyback tie-ups of organized players with farmers and price determination for farm produce at the district/ panchayat level to protect individual farmers and Growth of FPOs and ways to allow equity infusion into FPOS to improve their credit profile and scale would be effective.

'AGRI-EDUCATIONAL SYSTEM OF INDIA IS IN A TRANSFORMATIVE STAGE'

Recently, Punjab Agriculture University was adjudged best among 45 AICRP centres specialising in rice across India. The varsity secured two key awards, including best AICRP Centre (rice agronomy) and best AICRP Centre (overall). In an interaction with Agriculture Today, Dr Satbir Singh Gosal, Vice-Chancellor, Punjab Agricultural University, Ludhiana shares his thoughts on research aspects and the educational system of agriculture Universities. Excerpts from the conversation

How significant is improving the traits in agriculture production system?

Agriculture has become demand-led and data driven. Consumers and other stakeholders at the end of value chain play a major role in determining the kind of trait that we should prioritize. Processing traits also need attention to benefit from demand-led market. Malnutrition is a major concern in our country; mainstreaming biofortified crops rather than public distribution of physically fortified staples (like the recent use of fortified rice kernels) is a viable option. Focusing on wheat varieties like PBW RS 1, variety with resistant starch that helps in managing diabetes and weight gain can go a long way in managing these conditions. Offseason markets, especially in vegetables and fruits, can help in enhancing rural livelihoods. Our focus should be on harnessing traits that allow staggered maturity. Consumer preference traits like taste, cooking quality, texture, flavour, etc. also determine adoption rate of a variety. Varieties like PBW1 Chapati cater to such market segments, which offer higher income than the conventional MSP based market. Adoption rate of various resource conservation technologies can be improved if breeding programmes are targeted towards traits amenable to specific environments. For example, PBW 869 variety of wheat has traits that improve its germination in residue retaining/incorporating fields.

Adoption rate of various resource conservation technologies can be improved if breeding programmes are targeted towards traits amenable to specific environments.

Climate vagaries have become a regular phenomenon. Is PAU working on developing traits to combat climate change?

PAU is working on climate change related challenges like terminal heat stress and pre-harvest sprouting in wheat. Ef-

Speed Breeding Facility at PAU

forts are being made to develop varieties that mature late in relatively cool season so that yield advantages may be tapped from prolonged growth period. PAU has devised a number of water saving varietal and other technologies in rice and in other crops that help engage with the climate change driven frequency and intensity shifts in monsoon and winter rainfall seasons.

Different simulation studies are being conducted to predict future trajectories of key weather parameters. Micro-climatic modifications are being examined to tide over weather anomalies. The PR 126, a short duration variety of paddy, played a major role in shaping an emergency response during July 2023, as it fared well without any significant yield penalty during replanting of paddy fields.

As a researcher, what areas of significance do you think should India work in agriculture?

India should prioritize research and policy measures on various oilseed and pulse crops. Of late, ethanol blended petrol is gaining considerable traction. Sugarcane, maize, sorghum, etc. need special emphasis in this regard. Rising incidences of malnutrition on one end of the food spectrum and of diabetes, obesity and hypertension on the other end warrant due consideration in the formulation of breeding programmes. Fruit, vegetable and other staple crop breeding programmes need to be aligned not only with domestic consumer preferences but also beyond national boundaries. Research needs to be shifted towards developing AI based diagnosis and integrated plant health management modules. Research programmes need to be developed for devising sensor based smart irrigation and precision fertilizer application tools. India needs to align its organic farming standards with those regions to step into this sector in a meaningful way.

How important is collaboration between state universities and corporates?

PAU has been generating considerable revenue through the collection of testing fees for various agro-inputs like pesticides, weedicides, fungicides, fertilizers, growth regulators, etc. Infrastructural and technical capacity of the university, its unmatched connection with the peasantry, and its excellent perception in the minds of all the stakeholders are great pulls in this regard. Many industries continue to evince considerable interest in the technologies generated by the PAU from time to time. These industry partners have helped in commercialization of various PAU technologies in a good measure. Universities should endeavor towards securing internships for its students in major industrial houses. The CSR (corporate social responsibility) model also offers considerable academia-industry linkage opportunities in the agriculture sector.

What are the challenges associated with varietal development? Is the current regulatory environment in India motivational enough for researchers?

The Protection of Plant Varieties and Farmers' Rights Act, 2001 is already in place. However, in many cases, where the university is working in welfare mode, the variety has to be passed on to the farmers without any delay so that its adoption can take pick pace. With time, the variety can be challenged by resistance breakdown or other unforeseen issues. Under such scenario, it becomes difficult to go through the registration route.

What are your thoughts on the agri educational system of India?

Agri-educational system of India is in a transformative stage, and will have significant impact on agriculture with the implementation of NEP 2020. As per guidelines of NEP 2020, provisions have been made for multiple entry/ exit option and choice based skill enhancement courses, while designing UG course curriculum of 6th Dean's Committee. The final draft report is under consideration of ICAR. The choice based skill enhancement courses in Agriculture embedded in the degree programme will help to produce better skilled graduates which is likely to impact agriculture and enhance its productivity over the years. The provision of transfer of Academic Bank of Credit (ABC) during the UG programme will allow the students to transfer relevant credits in the institute of choice and can plan better agricultural education. India, being primarily, an agriculture based economy, should have 'Agriculture' as a compulsory subject in schools. Also, there should be provision of post of an 'Agriculture Teacher' in high schools.

GUMLA'S RAGI MISSION

THE STORY OF COLLECTIVE WILL AND LEADERSHIP

"In my area madua (Ragi) was traditionally cultivated, I also used to cultivate it in my 20 dismil patch and rice in 3 acres. We used to dry the madua on the road and reserved some quantity for domestic consumption and sold the remaining in the local market. Now, I am part of the Gumla Ragi mission as a FPO member. Having received training and support through the mission, I am cultivating ragi in 2 acres, and getting better incomes". - Bhagwati Devi, Board Member MVM Baghima-Palkot Farmer Producer Company, Gumla

The Story of Bhagwati Devi is the story of thousands of farmers of Gumla district in Jharkhand. Gumla was chosen as one of the Aspirational Districts under Aspirational District Program launched by Hon'ble Prime Minister in 2018.

With 2023 being declared as the International Year of Millet and Government of India launching the National Mission on Millet in 2018 and approving the Production Linked Incentive Scheme for Food Processing Industry of Millet based products (PLISMBP) in 2022, young Deputy Commissioner (DC) Sushant Gaurav saw an opportunity for Gumla. Sushant Gaurav, an Indian Administrative Service (IAS) officer of 2014 batch Jharkhand Cadre in 2022, decided to launch Ragi movement in Gumla's tribal hinterland.

Bhagwati Devi (first from left)Board Member, MVM Baghima-Palkot Farmer Producer Company, Gumla

Gumla's Ragi mission

Gumla is a rain-fed area mostly that compelled the farmers to have annually one major crop. The climate of Gumla was apt for millets like Ragi (finger millet) that is drought resistant, less water intensive compared to water guzzling paddy.

District Ragi Task force, was constituted under the chairmanship of Mr. Gaurav, in early months of 2022 with participation of Agriculture Department, Jharkhand Livelihood Promotion Society (JSLPS), Krishi Vigyan Kendra (KVK) etc.While having a discussion with farm-

The millet cafe has been a hit and has done sales of 78.44 lakh rupees since last April.

About the **AUTHOR**

Ramesh Kumar, Public Policy & Management fellow at IIM Bangalore. He is also a team member of Ragi mission Gumla, working as a Public Policy Professional in Gumla under Government of Jharkhand assignment.

ers before launching Ragi mission, Mr Gaurav highlighted two major challenges; firstly, to shift the farmers from dominant Paddy crop to water resistant, nutritious Ragi and secondly, to expand the existing Ragi cultivation through a concerted effort. With a series of Farmers workshops and field visits aimed at convincing farmers to adopt Ragi cultivation, he launched the Gumla's Ragi mission in 2022-23 with the participation of more than 5500 farmers in around 3000 acres.

MVM Baghima-Palkot Farmer Producer Company

Mr Gaurav established a Ragi dedicated Women led Farmer Producer Company - MVM Baghima-Palkot Farmer Producer Company. All these 5500 women FPO members were also part of women collective Self Help Groups (SHGs). The Cluster level Federation (CLFs); the top body of SHGs was also onboarded and convinced through constant communication in CLF meetups to invest their share capital in the value chain to procure the Ragi from farmers and supply to the FPO.

On 21 April 2023 Gumla was awarded the Prime Minister's Award for Excellence in Administration, the first district in the history of Jharkhand to be chosen for the coveted award."The Prime Minister's award was a result of a collective effort of people of Gumla with a clear determination and purpose at the leadership level. Sky is the limit for all those small and marginal farmers especially women farmers engaged in the Ragi mission".

-Sushant Gaurav, Former Deputy Commissioner, Gumla

Establishment of Millet Value Chain

The farmers were provided three levels of training between sowing and harvesting, and this resulted in an increase of 300 % production that year. It was important to establish the millet value chain with the potential to produce market-based Ragi products and District Administration built a 10000 sq. ft Millet processing centre with in-house Pulverizer to packaging units. The Processing centre was handed over to the women members of MVM BaghimaPalkot Farmer Producer Company.

Bountiful harvest

The immediate next cycle of 2023-24 yielded bright results with more than 25000 farmers volunteering to cultivate Ragi. Mr. Gaurav decided to tap this opportunity. 50 MT Ragi seeds were procured from Karnataka Agriculture University, recalls Ashok Kumar former District Agriculture officer. An official from the agri department reported that in 2023-24 Gumla's production stood at 60 MT. This year too production is expected to follow similar pattern.

In Dec 2022 Mr. Gaurav sent the Gumla Ragi team to participate in Raipur Millet carnival as an exposure trip and on the very first day laddoos worth 50k were sold earning positive feedbacks from the consumers. Following this, Mr. Gaurav established Jharkhand's first Millet Cafe; Johar Millet Cafe. The cafe is fully owned and operated by the FPO members.The increased production came in handy as the processing centre has 30 MT monthly capacity. The 30 CLFs put their share capital to procure 60 MT raw Ragi from farmers and supply it to women FPO.

With a series of Farmers workshops and field visits aimed at convincing farmers to adopt Ragi cultivation, Mr Sushant Gaurav launched the Gumla's Ragi mission in 2022-23 with the participation of more than 5500 farmers in around 3000 acres.

Value Added Products

Currently, the Johar Millet Cafe has six products in its basket: Ragi flour, Ragi

ladoo, ragi cookies, Namkeen, mixture, Khajuria (local snacks) apart from this the cafe has also, a live kitchen wherein hot Ragi samosa, dosa, dhuska etc are served to people. The millet cafe has been a hit and has done sales of 78.44 lakh rupees since last April. FPO board members have been adopting innovative methods by participating in local, regional and national fest to increase Gumla's Ragi footprint and sales. Diwali mela, JIASOWA mela, lit fest, Nagpur Youth festival and National Millet Carnival in Raipur received increased sales. To attract various consumer segments bamboo and jute packaged Ragi gift hampers, meeting snacks packets etc are being offered.

The Gumla's Ragi mission is a story of community's collective will, administrative leadership and teamwork. It is about taking cue at the right moment from the international, national thoughts, ideas and translating them at the grassroots of India.

DEMYSTIFYING MYTHS ABOUT PESTICIDES USE IN INDIA

Myth-Indian farmers use excessive Pesticides

Reality- India ranks 2nd in the world in agriculture production after China, but it ranks 12th in pesticide use. Most other countries including USA and those in the EU such as France, Spain, Italy, Germany etc., use more pesticides than India on per unit area and per unit of output basis. (source- FAOSTAT). Let it be known thatIndia's crop protection chemicals consumption is one of the lowest in the world.It far less amount of crop protection chemicals compared to developed and even emerging economies.

Country	Pesticide used per ha
India	0.38 kg/ha
China	11.0 kg/ha
Japan	10.9 kg/ha
France / Germany	3.7 kg/ha
UK	2.8 kg/ha

(Source: Philips McDougall and World Bank Database)

India's expenditure on crop protection chemicals is USD 2.5bn only which is 0.8% of total agri production. However for every 2.5 USD we spend on crop protection chemicals, we produce 126 USD of food/crop; far higher than countries like the US, Japan & Brazil. During Farmers Training Program (FTP) they are educated on the need to follow the government recommendations as per "package of practice" on dosage, crop segment time of spray etc.

Myth- Agriculture commodities in India carry high level pesticides residues

Reality- Annual studies under All India Network Project on Pesticide Residue show that on average only about 2.2% of the agri commodities show pesticide residues above Maximum Residual Limit (MRL). In other words, 98% of our agri commodities do not carry unacceptable levels of pesticide residue. This compares well with the data from other countries.

India's expenditure on crop protection chemicals is USD 2.5bn only which is 0.8% of total agri production.

Myth- Pesticides use has led to high cancer cases in India

Reality- Globally India ranks 172nd in cancer rates. Australia, New Zealand, Ireland, USA and Denmark are the top 5 that lead in cancer rates. Singapore with nil area under agriculture has more cancer rates than India. The largest incidence of cancer in India are in the states like Mizoram, Meghalaya, Sikkim etc., that hardly use pesticides in agriculture. Punjab ranks 24th among various states in each standardized cancer rates in India. (Source ICMR) Group I list of the WHO's International Agency for Research on Cancer (IARC) contains 120 substances considered to be carcinogenic to humans. Not a single agrochemical figures in this list.This clearly

Pesticides use per 1bn US$ agri. output			
Country	Agri. Output (bn US$)	Total pesticides used per year (technical grade in tonnes)	Pesticides used per 1bn US$ value of Agri. Output (technical grade in tonnes)
Brazil	83	377176	4544
USA	197	407779	2070
China	1020	1763000	1728
EU	251	367779	1465
Japan	52	52332	1006
India	479	61702	126
World	3515	4190985	1192

(Data accessed on 29th December 2021)

About the **AUTHOR**

Harish Mehta
Senior Advisor CCFI

proves that increased incidences of cancer cases are not linked to pesticides but are more a likely result of modern life style.

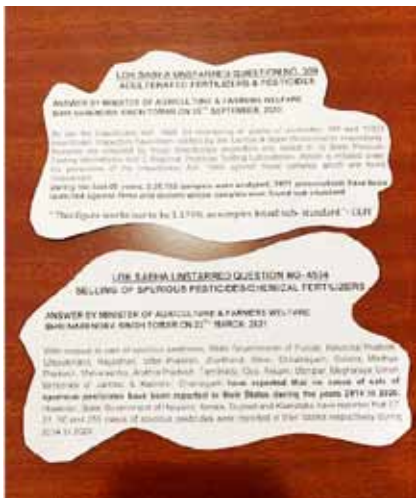
Myth- Accidental exposure to pesticides spray drift affects farmers

Reality- Pesticides are sprayed in ground operations, diluted with water. The water content would be as high as 99% in the pesticides spray when applied to the crops. Accidental short exposures to such pesticides spray drift would not deliver lethal dose to the body of the spraying person.Of course, it is always recommended that such exposures are avoided by using PPE safety kits.

Myth- Indian market is full of spurious pesticides.

Reality- On analyzing 3,38,182 samples drawn during the last 5 years by government, only 1.174% were found to be not meeting specification or were substandard. There were hardly any spurious samples as propagated by importing lobby.

Ministry of consumer affairs has been misrepresented on facts regarding their study on Awareness and problems of fake products. It was never a finding of their study that 58% of agri inputs available in rural market were found to be spurious, fake, illegal and counterfeits. In fact there is no such word as spurious in the Insecticides Act 1968.



Myth- India's water system, remain highly polluted with pesticides

Reality- Fish species are highly sensitive to water quality and toxic pollutants. India is the second largest fish producing country in the world. This shows that our water systems remains conducive to production of fish.Andhra Pradesh and Punjab despite being high users of Pesticides, are leaders in fish production. Andhra Pradesh & Punjab have the highest inland fish productivity at 6560 kg per acre of inland water area which is higher than in other states in India.

Myth- Pesticides are the primary means to commit suicide.

Reality- In India, farmers suicide account for less than 7% of the total suicide in rural villages.Self hanging is the most common method for suicide in India. Sikkim that does not allow use of pesticide has suicide rates four times then in Punjab. (Source: NCRB) 93% of the suicides in the India are by non- farmers i.e, by people not engaged in agriculture.Suicides, whether by farmers or non- farmers deserved our equal empathy.Main reasons are drug abuse, illness, financial issues, bankruptcy but not pesticides as wrongly propagated.

Myth- India uses pesticides that are banned in other countries

Reality- Use of pesticides in every country depends on local crops, climate, environment and occurrence of pests and diseases. Pesticides registration/ use therefore varies from one country to another and are granted after stringent field and laboratory trials, with strong element of sovereignty.The number of registered pesticide are:

Pesticides banned in India	Countries that still use them
Aldicarb	USA, China, Mexico, etc.
Carbaryl	USA, Canada, Brazil, Argentina, Mexico, Australia, Malaysia, etc
Diazinon	USA, Australia, New Zealand, Japan, China, Malaysia, Chile, etc.
DDVP	USA, Canada Australia, New Zealand, Mexico, Israel, Argentina, China, South Korea, Peru, Kenya, South-Africa, Tanzania etc.
Maleic- Hydrazide	USA, Canada, Brazil, Argentina, Mexico, Russian Federation, Japan, Australia, New Zealand, China, Netherlands, Germany, France, South Korea etc.
Tetradifon	Japan, South Korea, Columbia, South- Africa , Tanzania, etc.
Phorate	USA, Canada, Australia, China, South Korea, Taiwan etc.

(Source: www.homologa.com)

Myth- Organic and bio-pesticides are safer than chemical pesticides

Reality- All substance used as pesticides whether organic, bio or synthetic undergo the same toxicity, safety and efficacy assessments before allowed for commercial introduction.Stanford University, USA conducted study and found no evidence for differences in nutritional content for over 15 nutrients between conventional and organic produce. As per AINP, in vegetable samples (405 samples) collected from organic outlets across the country, as high as 12.3% among them had measurable crop protection chemical residues.(Source- All India Co-Ordinated Programme on Crop protection chemical, Residues, DAC, Delhi)

Myth- Indian manufacturers are not able to manufacture quality meeting global standards

Reality- Indian manufacturers produce quality which is in fact superior than imported products in terms of purity profile and efficacy. Our members account for 80% of exports to 130 countries with acceptable quality. Today it has been proved that Indian scientists and engineers are equal to the best in the world and we are able to produce superior quality pesticides at competitive price. Though last year we exported US$4.9 billion worth of pesticides, the world market of generic off patent pesticides is US$55billion. If unnecessary rules and regulations are streamlined and ease of doing business is done, we can boost our export of pesticides to US$40billion in the next 5 years.

Myths- Introduction of neonicotinoid insecticides adversely affected honey production.

Reality- The truth about the effect of pesticides on the honey production in India is to the contrary.Environmental experts across the world are up in arms against Neonicotinoids, which are a group of insecticides used widely in the farms for crop protection. They want to ban the use of Neonicotinoids, which in their opinion absorbed by plants and can be present in pollen and nectar, thus making them toxic to bees. If we go by the opinion of environmental experts, honey production in India should have hit rock bottom.India's honey production has been steadily on the rise. Honey production over the last three decades has grown steadfast in India from the first part of the 1990s (45,000MT) until last recorded in 2018-19(1,13,000)

Myths- Pesticides applied for non agriculture/ house hold is safe

Reality- Pesticides are applied at much higher concentration for non- agricultural pest control, when compared to the ones used against crop pests.Household pesticides are toxic pesticides similar to the ones sprayed on the field crop. Pesticides in the field used on various crop are in open environment whereas sprays and vaporizer used at home are in closed contained spaces.

NEED FOR A THOROUGH INVESTIGATION !

The recent media reports alleging the presence of "pesticide residues" in certain brands of spices exported from India to Singapore and Hong Kong has created a stir in India and across the world.

The Truth

The alleged pesticide in question, Ethylene oxide, however, is not registered as a pesticide in India under the provisions of the Insecticide Act 1968 and its rules. Ethylene oxide is primarily used as an industrial chemical and plays a vital role in the production of various chemicals, natural gas purification, and the creation of derivatives used in drilling oil and gas wells, according to the American Chemistry Council (ACC). It is also employed for fumigation, sterilization of medical equipment, and foodstuffs. The World Health Organization (WHO) highlights its use in sterilizing medical devices, preventing diseases and infections.

"Ethylene oxide is not a banned product in Singapore, and its use in the sterilization of spices is permitted under Singapore's Food Regulation with a Maximum Residue Limit (MRL) of 50 ppm. Data from the Centre for Food Safety in Hong Kong indicates that residues of Ethylene oxide above permissible levels were found in four samples of spices, including one from the USA, one from Indonesia, one from India, and another from Hong Kong itself," points Nirmala Pathrawal, Executive Director, CCFI.

A False Campaign

The selective media coverage, focusing solely on the sample exported from India calls for a comprehensive examination of the issue. The media has reported that Ethylene oxide as a carcinogen , whereas the International Agency for Research on Cancer (IARC), a part of WHO, categorizes it as hazardous as alcohol. In that sense, banning Ethylene oxide will entail banning of all types of alcohol as well.

"India is renowned as the 'land of spices', and holds the distinction of being the largest producer, consumer, and exporter of various spices. CCFI emphasizes that the level of Ethylene oxide in parts per million (ppm) cannot be used as a pretext to undermine India's spice trade, which amounted to $3.7 billion in exports for the year 2023," says Harish Mehta, Senior Advisor, CCFI.

Indian government authorities should publish a factual report on the matter to address concerns and safeguard the reputation of the Indian spice industry. It is incumbent upon them of countering incorrect, biased, and motivated negative campaigns that could harm the industry. It is of utmost importance to obtain accurate information and conduct a thorough investigation to ensure the integrity of India's spice exports and maintain consumer confidence in the quality and safety of Indian spices.

About the **AUTHOR**

CCFI

CROP CARE FEDERATION OF INDIA

PESTICIDES LADEN FOOD – AT WHAT COST

There have been multiple reports in the recent past about Indian food products being rejected across the world due to excessive Pesticide residues in food. Multiple agencies like APEDA, Spice Board, Tea Board etc. have also their own pre-export tests. Despite this it is alarming that many export consignments are getting rejected. If the same standards as those of importing countries like US, Europe or even Singapore were applied in India, a very high percentage would get rejected and be unworthy of consumption.

The Root Causes

The Maximum allowable residue limits (MRL) are way higher compared to developed countries. We continue to use many toxic pesticides like Monocrtophos, Chloripyriphos, Carbofuran etc. which are banned in many countries. Also, many chemicals which are not approved by the Insecticides Board are being widely used in India.

Most of the time farmers are dependent on pesticide companies and pesticide dealers for advice. They have their own vested interest – to sell maximum number of pesticides and their own products. The Extension departments in almost all states is defunct.

Irresponsible Agrochemical companies

Most Food processing companies do not check for residues of the incoming raw materials.

Poor monitoring and enforcement of food laws. As a result, there is no incentive for anyone to follow the law. Most food companies may not be aware about the MRL limits.

The emphasis during the past few decades has been on increasing the food production at any cost by using more chemical fertilizers, more pesticides. The government extension system is missing in action. We work with Organic farmers closely in 12 states. We rarely come across any government extension workers. The farmers are left at the mercy of agrochemical companies whose only interest to sell more of their products. In the process the farmers are misled, given wrong advice.

Also, food products are fumigated / treated frequently with Methyl Bromide, Aluminum Phosphide, Ethelene Trioxide (ETO) and shocking sometimes even with chemicals like Chlorpyriphos etc. No testing is done by most companies about the residues before selling the products.

About the **AUTHOR**

Rajashekar Reddy Seelam
Founder & Managing Director
Sresta Natural Bioproducts Pvt Ltd (24 Mantra Organic)

Dangers of Pesticide Exposure

The dangers to human health due to pesticides is well documented. The effect ranges from Cancer, Autism, affect neurological development of children, reproduction ability, reduced immunity, affects metabolism and now the latest evidence is its linkage to Parkinson's disease. Organ cancer like Kidney, Liver cancers are on the rise due to continuous exposure to pesticides through food. Farmers are most affected. Many studies show empirical evidence of cancer among farmers due to exposure to pesticides.

The way forward

- Promote sustainable farming practices and to the extent possible Organic / natural farming.
- Educate farmers and strengthen the Agri Extension system
- Evolve a code for advertisement/ promotion of Agrochemicals and impose heavy penalties for violations.
- Ban toxic pesticides and align our MRL standards with some of the better regulated countries.
- Make it mandatory for food companies and organized retailers (offline/ Online) to test incoming raw materials / Finished products for pesticide residues, report regularly and monitor continuously.
- Initiate hygienic storage conditions and safe treatment practices of raw materials.
- Educate consumers on the dangers of pesticide residues in food.

POLICY ROUND TABLE ON CROP PROTECTION

Indian Chamber of Food and Agriculture (ICFA) with the support of Agro Chem Federation of India (ACFI) hosted a policy round table on crop protection on 2nd May 2024 in New Delhi. The discussions focused on addressing challenges, exploring innovative solutions, and formulating strategic recommendations to enhance crop protection measures in India's agricultural landscape. The meeting was chaired by Sh. Faiz Ahmad Kidwai, Additional Secretary-PP, Ministry of Agriculture & Farmers Welfare, Government of India and Co-chaired by Dr. JP Singh, Plant Protection Advisor. Dr. Archana Sinha, Secretary, CIB&RC, Ministry of Agriculture & Farmers Welfare, was the special guest on this occasion.

Session Proceedings

by Dr. Kalyan Goswami, DG, ACFI, delved into statistics regarding crop protection and highlighted the industry's growth and challenges. He emphasized the importance of innovation and collaboration in tackling these challenges. Trends in the Indian crop industry were discussed, including challenges such as regulatory data protection, contract manufacturing, and the increasing cost of raw materials.

Mr. RG Agarwal, Group Chairman,

Dhanuka Agritech Ltd, highlighted the importance of new KYC norms in the crop sector and discussed regulatory frameworks and rules affecting the crop protection industry. Mr. Agarwal raised concerns about duplicate products in the market and their impact on the economy's growth and income generation. He shared valuable insights into industry data, R&D budgets, and the role of technology and innovation, emphasizing the significance of export-import dynamics.

Dr. KC Ravi, Chairman of CropLife India and CSO at Syngenta India Ltd, emphasized the industry's foundation in science and the critical need for investments in research and development. He highlighted the importance of government-industry interactions, suggesting that the current system has slowed down and advocated shorter registration timelines. Dr. Ravi stressed the necessity for collaborative efforts between the government and industry, mentioning best practices and the importance of acquiring the best technology for farmers.

Mr. Kimihede Kondo, Managing Director of Bharat Certis AgriScience Ltd., discussed the significance of export-import dynamics and manufacturing processes in the agricultural industry. Mr. Kondo emphasized the importance of leveraging cutting-edge technology and sustainable practices to enhance product quality and market competitiveness.

Mr. Raju Kapoor, Director of Public & Industry Affairs at FMC Ltd., delved into various aspects of the global supply chain and the need for a changed mindset to address challenges faced by people. He emphasized the "Make in India" initiative and highlighted the importance of global investments in the agricultural sector. The discussion expanded to include the use of pesticides, drone technology, and the potential for greater collaboration between government and private entities to deliver more value and foster growth and partnerships within the industry.

Mr. Rajesh Aggarwal, Managing Director of Insecticides (India) Ltd., emphasized the importance of making agriculture sustainable and ensuring the availability of quality inputs and technology. He discussed the pro-India opportunities and the need for more encouragement and investment in research and development. He specifically focused on addressing delays in registration processes, calling for improvements and faster approval and clearance mechanisms.

Mr. Juzar Khorakiwala, CMD, Biostadl India Ltd., underscored how the agricultural industry is propelled by scientific advancements and the need to make innovations more affordable for farmers. He stressed the ethical and moral responsibilities of companies in delivering value to society. Mr. Khorakiwala also addressed the competitive landscape, particularly comparing Chinese competitiveness with India's, highlighting the importance of creating an integrated ecosystem in India to foster competitiveness. He proposed strategies for dealing with corruption and emphasized the potential of biostimulants and biological solutions in agriculture.

Mr. Keshav Anand, Managing Director, Parijat Industries India Pvt. Ltd., focused on raising awareness about the importance of maintaining acceptable Maximum Residue Levels (MRLs) in the industry. He discussed the criticality of making informed decisions regarding reactants used in agricultural practices to ensure compliance with regulatory standards. Mr. Anand stressed the need for industry-wide cooperation and standardization in adhering to MRL regulations.

Mr. S.K. Chaudhary, Founder Director of Safex Chemicals India Ltd., emphasized the significance of research and development (R&D) in driving innovation and competitiveness within the agricultural industry. He discussed the challenges and importance of addressing patent issues to foster a conducive environment for R&D investments. Mr. Chaudhary highlighted the need for cost-effective solutions and stressed the value of molecule patents in driving sustainable agricultural practices.

Mr. Jitendra Mohan, Chief Operating Officer of Willowood Chemical Ltd., emphasized on the importance of sustainability and innovation in the agricul-

tural sector. He has advocated for the 3D reforms in CIB&RC to upgrade the existing guidelines to meet global standards, including certifications and fast-tracking the introduction of new molecules. He highlighted challenges related to product registration, proposing the implementation of QR codes for traceability and transparency. He stressed the importance of R&D discussions and suggested the necessity of pre-submission consultancy to navigate regulatory processes effectively.

Dr. Bakul Joshi, Chief Executive Officer of T Stanes and Company Ltd., called upon the industry to actively engage in initiatives like Make in India, emphasizing the significance of balanced import-export strategies. Dr. Joshi pointed out the challenges of standardization due to varying state regulations, advocating for a unified portal. He also stressed the urgent need for technological innovation. He discussed the imperative for industry-wide collaboration, standardized regulations across states, and the pivotal role of technology in driving agricultural advancements.

Mr. RD Kapoor, Head of Agri Support & Alliances at PI Industries Ltd., emphasized the importance of introducing new molecules and fast-tracking their registration process. He advocated for setting fixed criteria and proposed the establishment of a committee to oversee and verify these processes. Kapoor outlined the benefits of a streamlined registration system, highlighting the need for efficiency and transparency.

Mr. Abhishek Aggarwal, Chief Operating Officer (COO) of BR Agrotech Ltd., focused on solution-centric interventions. He highlighted the potential for exporting to the US and emphasized the importance of encouraging local players to manufacture agricultural products. Mr. Aggarwal stressed the need for building trust in domestic manufacturers, advocating for investments that foster growth and innovation within the industry. Additionally, Mr. Aggarwal proposed strategies to address registration backlogs and advocated for product clubbing, where similar molecules are grouped together for registration purposes.

Mr. Vipin Saini, Chief Executive Officer of the Bio Agri Solutions Association of India, presented several solutions during the deliberations.. Furthermore, Mr. Saini underscored the urgency of crop protection measures and suggested the formation of a technical coordination committee to facilitate faster registration processes. He emphasized the importance of data synchronization between state governments and the central ministry for efficient registration processes. Mr. Saini also welcomed the concept of eKYC (electronic Know Your Customer) and stressed the need for wiser manufacturing practices.

Dr. Ombeer Tyagi, Vice President of UPL Group, discussed the need to revise custom duties, enhance data protection measures, and improve pesticide management practices. One of the major challenges he highlighted was the differing regulations across states, posing a significant problem for the industry. He also emphasized the need for continuous dialogue and action-oriented strategies to overcome regulatory hurdles and promote sustainable agricultural practices.

Dr. Archana Sinha, Secretary of CIB&RC, Ministry of Agriculture & Farmers Welfare, Government of India, responded to the issues raised by the industry during the discussions. **Dr. JP Singh, Plant Protection Advisor at CIB&RC, Ministry of Agriculture & Farmers Welfare, Government of India,** in his concluding remarks he has highlighted the ongoing efforts to address registration pendency's, emphasizing the use of IT tools to streamline procedures and accelerate decision-making processes. **Chief Guest, Sh. Faiz Ahmad Kidwai, IAS and Additional Secretary of the Ministry of Agriculture & Farmers Welfare, Government of India,** articulated a vision of progressive policies and collaborative efforts to enhance the agricultural sector. **Dr. MJ Khan, Chairman ICFA,** extended a heartfelt Vote of Thanks and emphasized the importance of the discussions in fostering meaningful collaborations and formulating actionable strategies for the agricultural sector.

RECOMMENDATIONS

- Establishment of a Working Group:
- Invest in Agro-Tech
- Promote AI Applications
- Enhance Data Protection Measures
- Facilitate Export Opportunities
- Improve Pesticide Management
- Standardize Registration Procedures
- Promote Sustainable Practices:
- Encourage Skill Development
- Invest in Climate-Resilient Agriculture
- Public-Private Partnerships
- Promote Agri-Entrepreneurship

AGRICULTURE TODAY
The National Agriculture Magazine

AGRICULTURE TODAY GROUP

ANN
Agri News Network

PRINT AND DIGITAL SUBSCRIPTION

SUBSCRIPTION TARIFF

S.No.	ONE YEAR 12 ISSUES	PRINT	DIGITAL
1.	Individual	800	400
2.	Student	500	250
3.	Organisation	1200	600
4.	Institute / Library	1200	600

FOR SUBSCRIPTION AND BUSINESS QUERIES

Please call in +91 7290031468 or Email @ vinita.singh@agriculturetoday.in

visit our website www.agriculturetoday.in

Regular Posting Date 27-28
Date of Printing 23
Post Office: Lodhi Road

DL(ND)-11/6128/2024-25-26
RNI No. 68745/98

SBI
The banker to every Indian

KISAN KI UNNATI SE HAI DESH KI PRAGATI.

SBI Agri Loan Products for your every agricultural need.

AGRI GOLD LOAN

- Digital sanction on YONO KRISHI
- Low interest rate

KISAN CREDIT CARD

- Interest rate at 7% p.a., up to ₹ 3 lakhs*
- 3% incentive for prompt paying farmers, up to ₹ 3 lakhs*
- Collateral-free loan for up to ₹1.6 lakhs

MUDRA LOAN

- No collateral up to ₹10 Lakhs
- Simple documentation

LOANS FOR SELF-HELP GROUPS

- Loan for livelihood
- Flexible repayment

TRACTOR LOAN

- Landholding required: 2 acres
- Flexible repayment
- Low intrest rate

ASSET-BACKED AGRI LOAN

- Loan up to ₹ 2 Cr.
- Low interest rate

ATMA NIRBHAR BHARAT SCHEMES:

- Loans available under Agri Infra Fund, PMFME scheme, AHIDF scheme
- To establish cold storage, warehouses, silos, food processing units, etc.
- Credit Guarantee available
- Interest subvention available

FARMER PRODUCER COMPANIES (FPCs)

- Loans available for all activities of FPCs
- Attractive interest rates
- Credit guarantee available
- Interest concession available

*T & C Apply

For more details, visit bank.sbi or contact Branch Manager