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54th Annual General Meeting (AGM) & 62nd National Symposium 2021

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CONTENTS

MESSAGE

Shri. Parshottam Rupala - Minister Fisheries, Animal Husbandry & Dairying , New Delhi.	9
Dr. Sanjeev Kumar Balyan - Minister of State For Fisheries, Animal Husbandry & Dairying, Krishi Bhawan, New Delhi.	11
Dr. O. P. Chaudhary - Joint Secretary Government Of India Ministry Of Fisheries, Animal Husbandry & Dairying Department Of Animal Husbandry And Dairying Krishi Bhawan, New Delhi.	13
Daniel Bercovici - Chairman, International Feed Industry Federation, Germany	15

WELCOME ADDRESS OF CONVENOR 20

WELCOME ADDRESS OF JT. CONVENOR 24

CHAIRMAN'S ADDRESS 29

SECRETARY'S ADDRESS 34

PROGRAMME SCHEDULE 38

CLFMA AWARDEES 45-52

CONTENTS

TECHNICAL SESSION

Bio Data - Ms. Prerana Desai	55
Bio Data - Mr. Unupom Kausik	56
Bio Data - Mr. Balram Singh Yadav	57
Bio Data - Mr. G. Chandrashekhar	58
Bio Data - Mr. Mrugank Paranjape	59
Bio Data - Mr. B. Soundararajan	60
Bio Data - Mr. Bahadur Ali	61
Bio Data - Mr. Rahul Kumar	62
Bio Data - Mr. Tarun Shridhar	63
Bio Data - Dr. Beeda Masthan Rao	64

ARTICLES OF INTEREST

Feeding The Growing Livestock Population: Current & Future Challenges Dr. S.Senthil Murugan	65
Feeding of Sugar Industry By-Products For The Growing Livestock Population C.Kathirvelan and S.Banupriya	68
Livestock In India: Facts, Major Challenges And Opportunities Amrish Kumar Tyagi and Banakar P S	71

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MESSAGE

I am glad to learn that CLFMA OF INDIA's 54th Annual General Meeting and 62nd National Symposium on the theme "Feeding the Growing Livestock Population: Current & Future Challenges" will be held on 24th and 25th September 2021 at Hotel Taj Deccan, Hyderabad, Telangana.

Livestock Industry today is at the crossroads and all stakeholders of this sector need to work in a systematic manner in the coming years to become globally competitive. I acknowledge the focused efforts by CLFMA in this direction for the overall development of livestock as well as its allied sectors.

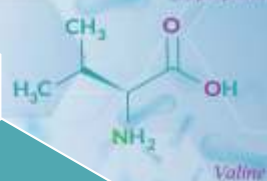
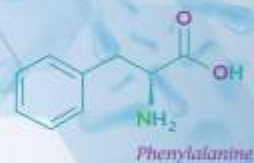
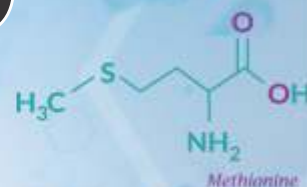
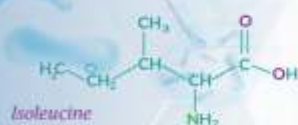
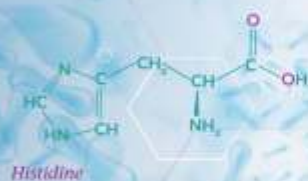
I hope that the 62nd National Symposium would be beneficial for all stakeholders of the livestock sector while contributing to boost the farmers' income,

I wish the 62nd National Symposium all the **SUCCESS**.


(Parshottam Rupala)

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MINISTER OF STATE FOR FISHERIES,
ANIMAL HUSBANDRY & DAIRYING
GOVERNMENT OF INDIA
KRISHI BHAWAN, NEW DELHI - 110 001

MESSAGE

I am glad to know that CLFMA OF INDIA is organizing 54th Annual General Meeting and the 62nd National Symposium on the theme **"Feeding Growing Livestock Population: Current & Future Challenges"** on 24th & 25th September, 2021.

India has one of the largest livestock populations in the world and proper feeding of the livestock faces huge challenges, particularly in the light of growing food demand for human population, diversion of food grains for bio-fuels, effect of climate changes on fodder production etc. Also, volatility in prices of food and feed commodities and also constraints of supplies due to scarcity will continue in the coming years and, as a consequence, affect livestock production. I hope that the 62nd National Symposium of CLFMA OF INDIA on the theme "Feeding Growing Livestock Population: Current & Future Challenges" could play a vital role as a platform in sharing new ideas and techniques for enhancing production and availability of various feed resources for livestock so as to face the future challenges in feeding the growing livestock in India.

On the occasion of the 54th Annual General Meeting of CLFMA OF INDIA and their 62nd National Symposium, I extend my best wishes to the organizers and participants for the grand success of the event.

(Dr. Sanjeev Kumar Balyan)

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KRISHI BHAWAN, NEW DELHI - 110 001

MESSAGE

Livestock industry, feed sector in particular, has been quite resilient to the COVID-19 crisis. However, the sector is not free from the implications of post Covid challenges. This, coupled with the task of feeding of 536.76 million livestock calls for appropriate interventions at various levels. In this context, the event being organized by CLFMA of India - 54th Annual General Meeting and the 62nd National Symposium on 24th - 25th September 2021, and the theme chosen **"Feeding the Growing Livestock Population: Current & Future Challenges"** need special attention.

Shortage of some feed ingredients and associated price hike has been obvious in the current year. Apprehensions on feed quality and feed security are on another side. In this context, the scope of transformation of Indian feed sector is tremendous. The Government of India is taking various initiatives primarily to ensure feed quality and feed security. The current year is remarkable with the launching of various entrepreneurial activities in livestock sector under the realigned National Livestock Mission (NLM) of the Department of Animal Husbandry and Dairying, Government of India. The entrepreneurial activities for value addition of fodder and assistance for quality fodder seed production under NLM are the activities specifically formulated to contribute to feed security at farmers' premises.

Animal Husbandry Infrastructure Development Fund is yet another flagship scheme of this Department promoting entrepreneurship and employment. The scheme may be well exploited by the feed industry to set up diverse livestock feed plants capable of producing conventional/value added feed.

CLFMA of India has always been at the forefront to intervene and notify the feed related issues to Government of India. I appreciate and acknowledge the focused efforts of CLFMA of India towards the holistic development of livestock sector.

I believe that the 62nd National Symposium organized by CLFMA brings about concrete suggestions and proposals for the advancement of the sector.

On this occasion, I wish CLFMA of India's National Symposium a grand success.

(Dr. O. P. Chaudhary)

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09 September 2021

Mr. Neeraj Kumar Srivastava

Chairman

CLFMA OF INDIA

Mittal Chambers, 111

11th Floor, Nariman Point

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India

REF: Thank you for the invitation to your 62nd National Symposium

Dear Mr. Srivastava,

On behalf of the International Feed Industry Federation (IFIF) I would like to thank you very much for your kind invitation to the inaugural session of your 62nd National Symposium on 24th September 2021.

It would have been an honor for us to attend and join you and the Indian Feed Industry colleagues at this special association.

Unfortunately, we are not available on that date as we are holding our annual IFIF meeting with the UN FAO at the same time.

Please do not hesitate to contact me or Alexandra de Athayde, IFIF Executive Director, should you have any questions and we wish you much success for your Symposium !

Sincerely,

Daniel Bercovici

Chairman

International Feed Industry Federation



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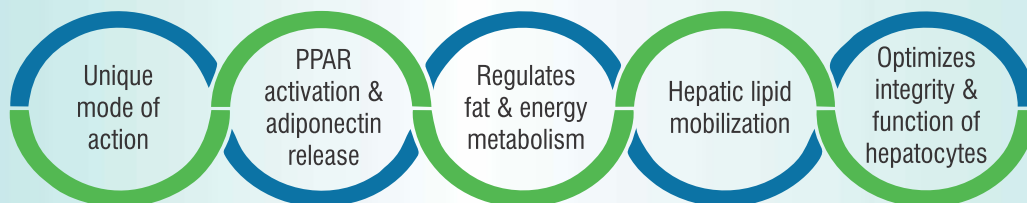
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Convenor Address



It gives me immense pleasure to extend a warm welcome to all the members, delegates, speakers, awardees and guests to the 54th AGM and 62nd National Symposium of CLFMA 2021. This year's symposium theme, **“Feeding the Growing Livestock Population: Current & Future Challenges”** will most certainly be beneficial for all the stakeholders of the Livestock Industry.

For the last 54 years, CLFMA has been proactively working together with the Government of India, and other trade bodies, making its presence felt both nationally and internationally. CLFMA operates as the nerve center for developing, drafting and designing of policies that promote sustainable growth in the Animal Husbandry Sector (the backbone of Indian economy) and is the nodal agency for providing vital industry information.

The classic example of CLFMA working hand in glove with the government bodies is that it was actively involved with the government authorities to solve the Soybean Price Rise issues. The CLFMA delegation conducted multiple meetings and discussions with various government Ministers such as Shri. Om Birla, Hon'ble Speaker of Lok Sabha, Shri. Bhupender Yadav, Hon. Minister of Environment, Forest and Climate Change of India, Dr. Bhagwat Karad, Hon. Minister of State, Ministry of Finance, Dr. Sanjeev Kumar Balyan, Hon'ble Minister of State, Animal Husbandry, Dairying and Fisheries, Shri. B. B. Patil, Member of Parliament, Zahirabad (Lok Sabha), in an effort to solve the soybean meal issues. Post which the government made a monumental decision, allowing import of crushed and de-oiled GM Soy cake-NLO.

CLFMA is organizing a day long National Symposium on 25th September 2021 at Hotel Taj Deccan Hyderabad. The theme of this year's Symposium is “Feeding the Growing Livestock Population: Current & Future Challenges.”

The Symposium will have two sessions followed by a roundtable discussion. In the first session, the invited speakers will talk about Demand, Supply Commodity Outlook for Corn & Soybean. These two commodities contribute significantly to the compound feed production. In the year 2021 these two commodities have witnessed huge volatility, resulting in rising feed costs & cost

of production. In this session speakers will be giving their insights on current & future outlook of these two commodities.

Second session will have speakers talking about Sustainability of Online Sales of Poultry Products, Online Trading of Agri Commodities and Policies related to Import & Export of Corn and Soybean. In this session, the speakers will enlighten the delegates on strategies to overcome the challenges for the growth of animal agriculture in India.

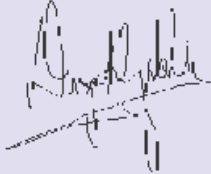
The Roundtable Discussions will have participation of Animal Agriculture Experts from the fields of Dairy, Poultry, Aquaculture & Policy Making.

Before I close, I would like to extend a warm welcome to all the members, delegates, speakers, awardees and guests from India and overseas to be a part of this Symposium.

Throughout this Symposium, I would request you all to stay engaged and your proactiveness will help us frame outcomes which will be beneficial to achieve sustainable growth in our sector.

At last, I would like to extend my personal respect and thanks to all of you.

Regards,

A handwritten signature in black ink, appearing to read 'Divya Kumar Gulati', with a long horizontal stroke extending to the left.

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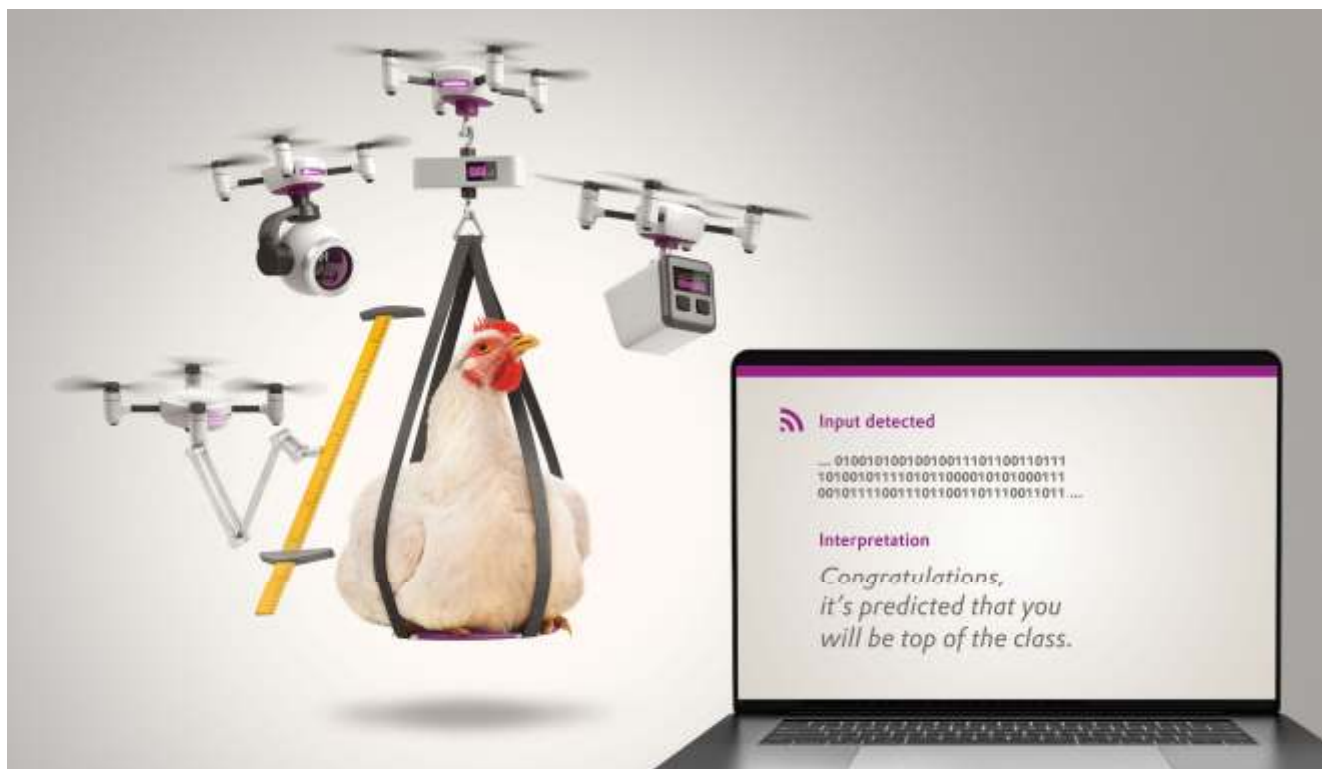
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Jt. Convenor Address



My Dear Delegates,

On behalf of CLFMA OF INDIA, it is my pleasure to welcome all the esteemed members, delegates, speakers, awardees to the 54th AGM and 62nd National Symposium 2021.

We look forward to welcoming you all from around the globe to explore, share and be inspired by the innovative sessions of the National Symposium 2021.

For the last 54 years, CLFMA OF INDIA has been functioning relentlessly for the overall progress and economic growth of Livestock Industry.

As you are aware that CLFMA is one among the most trusted organizations, which collaborates not only with Government of India but also with the trade bodies Nationally and internationally by providing valuable information in developing, drafting and designing policies for the sustainable growth of Animal Husbandry Sector; which plays a pivotal role in our agrarian economy.

Our Symposium theme is **"Feeding the Growing Livestock Population: Current & Future Challenges"**.

In this year, industry faced a big challenge in procuring protein source basically Soya meal. Soya Meal prices soared to a high of Rs.90,000/-mt from Rs.38,000/-mt. A rise by almost 136 percentage. This was also just in a span of 8 weeks.

This has happened for the first time in the history of Animal feed Industry. As the market forces act, there was cascading effect on the rise of prices of other protein sources propelling the entire feed Industry to panic and confusion. This resulted in the phenomenal increase in the production cost of Milk, Eggs and Poultry meat, hurting the demand and consumer uptake.

CLFMA team worked very hard at Government level for industry's sustenance. There were representations from other Associations also.

CLFMA team realised that the hindrance was from Environmental Ministry because of misconception. The team took special efforts to convince the Honorable Minister and the Top bureaucrats of the Ministry and thus the permission was granted. Govt. of India has given permission of import of GM Soya meal. CLFMA OF INDIA thanks the Govt. of India for showing concern and extending full help to this burden some problem faced by Livestock Industry.

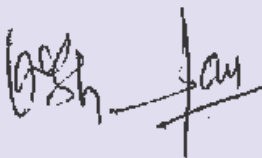
This sudden stock out of meal and hence the price increase has hurt entire livestock Industry in India.

CLFMA needs to remain alert to this situation and should be ready with all the data inputs to help the Govt of India to take a pragmatic view of such situations in future years to come.

The concept behind the Symposium 2021 is to plan in advance for coming days. Things should not happen as they happened for Soya meal.

I request the delegates to enjoy the Symposium, participate and contribute your valuable knowledge for the overall success of the Symposium 2021.

Thanks & Regards,



VIJAY D. BHANDARE
President - South Zone & Joint Convenor
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Chairman's Address



Feeding the Growing Livestock Population: Current and Future Challenges

It gives me great pleasure to welcome you all to CLFMA of India's 54th Annual General Meeting and 62nd National Symposium on 24th & 25th September 2021 at Hotel Taj Deccan, Hyderabad, Telangana.

On behalf of CLFMA and its board, I extend my sincere gratitude to the Honorable Dignitaries, Special Guests, and Expert Speakers from India and abroad for their patronage and participation for making this Symposium a resounding success.

By 2050 the world's population will likely increase by more than 35%. To feed that population, crop production will need to double, and production will have to far outpace population growth as the developing world grows prosperous enough to eat more meat. Treading on this tightrope is not going to be an easy task and it requires a major shift in how we are consuming and producing our food today? We are going to focus on this vital topic in our Symposium titled as '**Feeding the Growing Livestock Population: Current and Future Challenges.**'

We'll likely have 9 billion human population on our planet and additional 2 billion more mouths to feed by mid-century. The spread of prosperity across the world, especially in China and India, is driving an increased demand for meat, eggs, and dairy, boosting pressure to grow more corn and soybeans to feed more cattle, pigs, and chickens. If these trends continue, the double jeopardy of population growth and richer diets will require us to roughly double the amount of crops we grow by 2050. At the same time, we urgently need to cut greenhouse gas (GHG) emissions from agricultural production and stop conversion of remaining forests to agricultural land to hold global warming below 2°C (3.6°F), the level necessary for preventing the worst climate impacts.

India is already witnessing a gap between demand and supply of feed, fodder and concentrates to meet the requirements of increasing livestock population due to increased demand of animal protein. This shortage is attributed to increasing pressure on land for growing food grains, oilseeds and pulses and inadequate attention being given to the production of fodder crops. As per the estimates of NIANP (National Institute of Animal Nutrition and Physiology), the deficit of green fodder, dry fodder and concentrates is expected to reach 40 MT, 21 MT, and 38 MT by 2025, respectively. Similarly, for poultry industry the requirement of maize is around 23 MMT and adding together the demand for starch, fuel, and other industries the total maize demand reaches to 32-35 MMT, this is almost the same amount India is producing today. The domestic grain production will not be able to keep pace with growing energy and protein demand for animal feed unless some immediate steps are being taken to increase per acre productivity and total production of grains like maize and soybean.

The challenge of food security has been aggravated by biofuel subsidies. Biofuel is an inefficient source of energy and its primary to final energy conversion is 24% lower than the fossil fuels. According to an estimate using all the harvested biomass on Earth including crops, crop residues, grass eaten by livestock and wood - would only provide about 20 percent of global energy needs in 2050. There should be policy intervention to eliminate biofuel subsidies and not treating bioenergy as “carbon-neutral” in renewable energy policies and GHG trading programs. This will reduce the food deficit gap by 7-8%.

For having a sustainable animal production in future, immediate interventions in the following directions are required:

1. Reducing food wastage
2. Enhancing fodder and grain production with efficient use of available land and forest areas
3. Using high-tech, precision farming to boost yield on very available farm
4. Finding more efficient ways to grow meat

5. Efficient feeding programs for livestock
6. Curtailing the use of food crops for biofuels
7. Evaluating and allowing genetically modified grains to increase per acre productivity

Research is also going to play a very important role for addresses these challenging problems, specifically, how to provide the optimal nutrition that results in minimal nutrient excretion or emission. Nutrition that produces meat, milk, or eggs with the lowest input and has the least impact on the environment or humankind. Research that provides a more desirable or healthier product.

Natural feed additives will play a role in animal production along with functional ingredients like probiotics, essential oils, feed enzymes, genetically modified grains, and many other functional ingredients. All will need to be evaluated in current production systems across multiple animal species for sustainable livestock production.

The challenge of feeding 9 billion people by 2050 is tough and requires herculean efforts and major shift to how we produce and consume food. We need to find a balance between producing more food and sustaining the planet for future generations. I am very confident that the Symposium will be a great opportunity for the confluence of innovative and path breaking ideas that'll pave the way for sustainable livestock farming and agriculture in future.

I look forward to your gracious presence for making this event a resounding success.

With regards,



Neeraj Kumar Srivastava
Chairman

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Hon. Secretary's Address



As the Hon. Secretary of CLFMA of India, the APEX National Association representing the animal protein sector of India, it is my pleasure and great honour to welcome you all to our 62nd National Symposium on 24th & 25th September 2021 at Hotel Taj Deccan Hyderabad.

I extend my sincere gratitude to our Esteemed Dignitaries, Special Guests, Experts Speakers, Delegates, Sponsors and all others who have supported in making this Symposium a grand success.

CLFMA has successfully completed 54 eventful years and is going from strength to strength supported by active and committed members.

The Symposium theme chosen for deliberation this year is **“Feeding the Growing Livestock Population: Current & Future Challenges”**

The Symposium will have deliberations addressing Demand, Supply Commodity Outlook for Corn & Soybean, as these commodities contribute significantly to the compound feed production, Sustainability of online sales of Poultry products, online trading of Agri commodities, & Policies related to Imports & Exports of Corn. The hallmark of this Symposium is the “Round Table Discussion”, which will have participation from Animal Agriculture experts from, Dairy, Poultry, Aquaculture & policy experts. The panelist will share insights on roadmap for growth of animal agriculture in India.

The Symposium would aim at identifying workable, practicable and implementable solutions for growth and development of the animal agriculture and disseminate key elements of the Symposium outcomes to all our stake holders. The Symposium has been carefully designed and

the sessions and speakers judiciously selected, so as to ensure that the best possible talent and inputs are made available to all the participants.

There would be Purpose-Oriented discussions during each session, which would deal with the various challenges faced by animal agriculture stakeholders.

The Symposium would be attended by a large number of senior officials from the Industry (Dairy, Poultry, Fishery and other stakeholders of livestock industry), Academic Institutions, Farmers, Poultry Integrators, Government Institutions, International Organizations etc. from the sector.

I'm confident that during the two days there will be plenty of opportunities for all the participants to share and discuss the critical issues faced by the industry and have interactions with senior government representatives and the outcome of this would help to accelerate the overall growth of the livestock sector in a sustainable manner and improve the wellbeing of several livestock farmers and other related stake holders of the country's livestock industry.

I look forward to seeing you soon at Hotel Taj Deccan, Hyderabad.

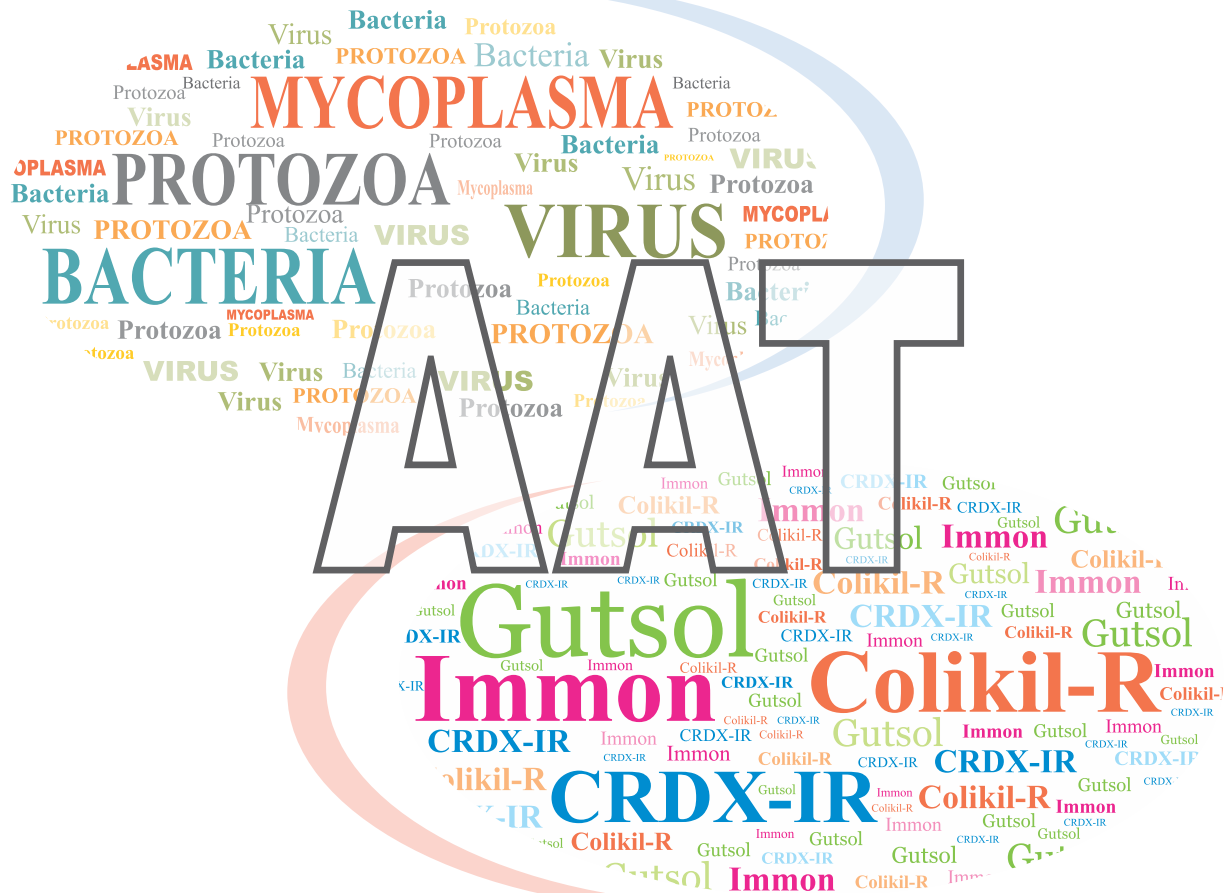
With Regards,

A handwritten signature in black ink, appearing to be 'Suresh Deora', written in a cursive style.

SURESH DEORA
Hon. Secretary
CLFMA OF INDIA



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CLFMA 54th AGM & 62nd National Symposium 2021

24th & 25th September 2021

Hotel Taj Deccan, Road No.1, Banjara Hills,
Hyderabad - 500034, Telangana

**"Feeding the Growing Livestock Population:
Current & Future Challenges"**

Day-1- Friday, September 24, 2021

10:30 hrs.	Registration of Delegates	
11:00 hrs	Managing Committee Meeting	
13:00 hrs	Lunch	
14:00 hrs-15.00 hrs	54 th Annual General Meeting	
Inaugural Session		
16:00 hrs.	Inauguration & Lighting of Lamp	
16:21 hrs	Welcome Address	Mr. Divya Kumar Gulati – Convenor
16:23 hrs	Joint Convenor Address	Mr. Vijay D. Bhandare – Joint Convenor
16:25 hrs.	Chairman Address	Mr. Neeraj Kumar Srivastava, Chairman
16:35 hrs.	Keynote Address	Dr. O. P. Chaudhary, Joint Secretary (NLM/PC), Dept. of Animal Husbandry & Dairying, Ministry of Fisheries, Animal Husbandry and Dairying, GOI.
16:50 hrs.	Address by Guest of Honour	Shri. Talasani Srinivas Yadav, Hon’ble Minister for AH, DD and Fisheries, Telangana.
17:00 hrs.	Address by Guest of Honour	Dr. Bhagwat Kishanrao Karad, Hon'ble Minister of State, Ministry of Finance, GOI.
17:10 hrs	CLFMA Awards Ceremony	
17:30 hrs.	Chief Guest Address	Shri. Parshottam Rupala, Hon'ble Minister of Fisheries, Animal Husbandry and Dairying, GOI.
17:45 hrs.	Vote of Thanks	Mr. Suresh Deora – Hon. Secretary
19:00 hrs	Networking Dinner & Live Performance	

Day-2: - Saturday, September 25, 2021

9:00 hrs	Registration	
10:00 hrs	Welcome Address	Mr. Neeraj Kumar Srivastava, Chairman
Session-1: - Demand Supply Outlook of Corn & Soybean		
10:15 hrs	Have Corn Dynamics Changed in Recent Years?	Ms. Prerana Desai, Head of Research, Samunnati Agri
10:45 hrs	Market Driving Factors: Soybean & Soybean Meal	Mr. Unupom Kausik, President, NCML
End of Session		
Session -2: - Special Address		
11: 15 hrs	Sustainability & Future of Online Sales of Poultry products	Mr Balram Singh Yadav, Managing Director, Godrej Agrovet Limited.
Session-3: -Strategies for Sustainable Animal Agriculture		
11:45 hrs	Contours of Sustainable Animal Feed Market	Mr. G. Chandrashekhar, Economist, Senior Editor, Policy Commentator
12:15 hrs	Market Linkages: Derivatives, Spot for Animal Feed products	Mr. Mrugank Paranjape, Managing Director & Chief Executive Officer of NCDEX e- Markets Limited
12:45 hrs	Q&A	All the speakers
13:15 hrs	Lunch Break	
Session- 4: - Round Table Discussion		
14:15 hrs	Panellists <ul style="list-style-type: none">• Mr. B. S. Yadav, MD, Godrej Agrovet Ltd.• Mr. B. Soundararajan, Chairman, Suguna Holdings Pvt. Ltd.• Mr. Bahadur Ali, Managing Director, IB Group• Mr. Rahul Kumar, CEO, Lactalis India Ltd.• Shri. Tarun Sridhar, IAS (Retd.), Former Secretary, Dept of AH&D, Ministry of Fisheries, AH&D.• Dr. B. M. Masthan Rao, Chairman, BMR Group	
Valedictory Session		
16:15 hrs	Summation of Symposium	Shri. S. V. Bhawe, Past Chairman, CLFMA OF INDIA
16:25 hrs	Felicitation of Sponsors, Media, Guests and Invitees	
17:25 hrs	Vote of Thanks	Mr. Suresh Deora – Hon. Secretary
19:30 hrs	Networking Dinner	

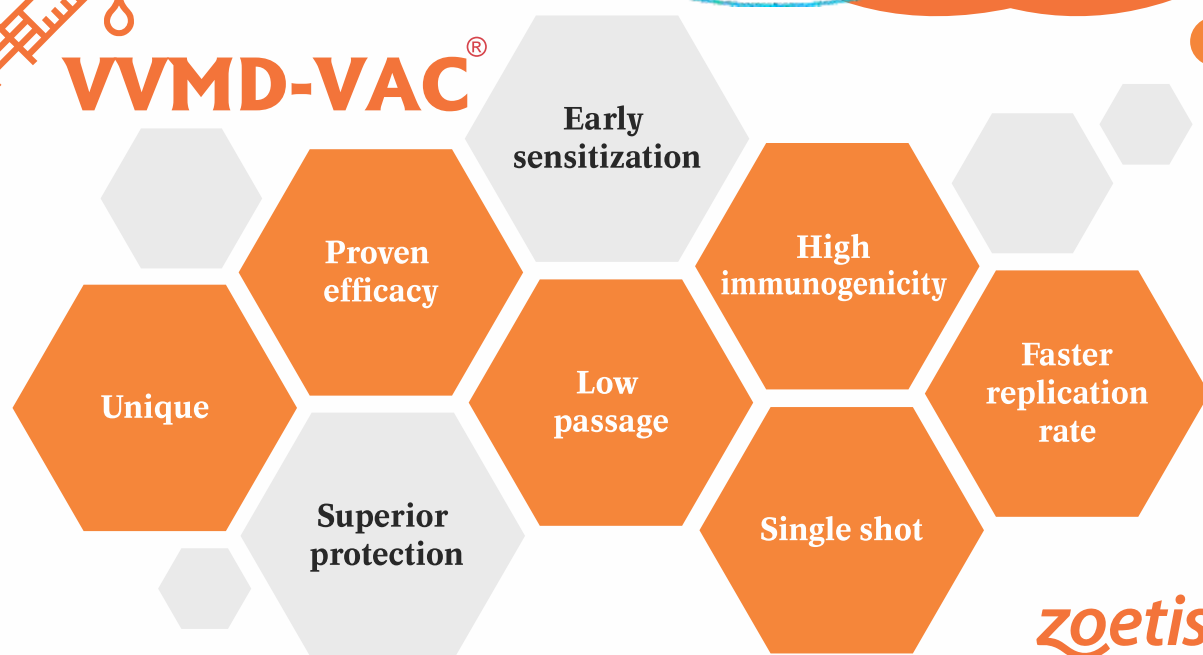
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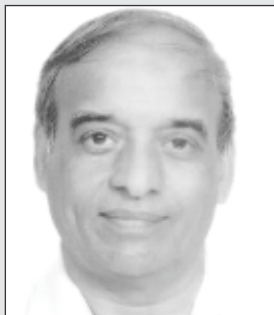
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CLFMA Life Time Achievement Award



Dr. Subhash V. Vaidya
Chairman, Noble VetScience LLP

Dr. S. V. Vaidya is a graduate in Vet. Science from Nagpur Veterinary college, post graduate from Jabalpur Veterinary college and Ph.D. in Poultry Science from IVRI, Izatnagar ,U.P.

He Joined the Poultry sector of the industry in 1975.

In 1977, Dr. S. V. Vaidya joined Hindustan Lever Ltd. as Asst. Development Manager. It was in this Company that Dr. S. V. Vaidya's Professional Career blossomed. He could get opportunity to run the Feed unit, technical assistance in the export, Management techniques of International standards, managing the Branch and operating procedures related to feed business.

Dr. S. V. Vaidya slowly acquired knowledge in every aspect of running the business.

Dr. S. V. Vaidya joined Pranav Agro in 1993 as Chief Executive and rose to become Managing Director by 1998.

It was in this assignment in Pranav Agro that Dr. S. V. Vaidya with his inputs made remarkable contribution in the field of Poultry Nutrition.

Although there were quite a few nutritionists who were trying to use soya-based feed, it was Dr. S. V. Vaidya who made it possible on a very large scale.

Pranav Agro became the first company in India to launch very successfully the Vegetarian feed without fish meal.

That time this was looked upon in dismay by many large houses with doubt and uncertainty.

Over a period, whole Industry followed this norm and use of Fish meal in the poultry feed became a part of Nutritional history by 1998.

Dr. S. V. Vaidya started his contribution in CLFMA by making technical presentations and

presenting them to various Govt. Departments. He worked as a Secretary, Deputy Chairman in CLFMA.

He became Chairman of CLFMA during 1999 and 2000.

During his period, computerization was introduced in CLFMA. He also represented CLFMA to IFIF – International - Feed - Industry - Federation in London and presented a paper on “Non-use of Meat meal in Cattle feed in India-the status.”

Dr. S. V. Vaidya has set up a group of companies called Noble Life Science Pte Ltd in Singapore and is involved in a unique research work based on the concept of Life energy, using plant alkaloids. His poultry feed additive products have PAN India presence and exports to Philippines, Bangladesh, Sri Lanka and Nepal.

Lastly, He has ventured in Homeopathy Medicines in human beings with 20 years of experienced technical support and three years of human trials. His company is known as “Noble Life Energy Pvt Ltd”. The products have been recently launched in July 2021.

He continues to assist CLFMA on technical matters even today.



CLFMA Life Time Achievement Award



Mr. Bharat Tandon

Past Chairman, CLFMA OF INDIA

Founder / Chairman of Fibroheal Woundcare (P) Ltd. (FWPL)

MD, Healthline Pvt. Ltd. (Sericare Division)

Career milestones:

Mr. Bharat Tandon started his career international pharma and worked for seven years in Pharmaceutical Company, which is now named Astra Zeneca Pharma Ltd.

In 1984 he ventured out to start an Animal Health/Nutrition Company.

He was the Managing Director of Vetcare Group of Companies, Vetcare Organics and Tetragon Chemie Pvt Ltd. It is also popularly known as VETCARE. The Company dealt in Research, Manufacture, Marketing, and Exports of Animal Health and Nutrition products for entire spectrum of Commercially important species, which includes Poultry, Dairy, Aquaculture, and companion animals (PETCARE).

Mr. Bharat Tandon started VETCARE, a small company with a modest turnover of Rs.12 lacs per annum and in 25 years it became, among the largest company in India in the space of Animal Health and Specialty Nutrition with a turnover of Rs.360 crores at the time he handed over the charge, in September 2009. VETCARE had 7 manufacturing operations including NOIDA, Sri Lanka (Provimi Vet Lanka (P)Ltd, and field marketing operations in Nepal, Bangladesh and Malaysia. Later in the year 2000 Vetcare formed a joint – venture with Provimi BV of Holland. Export markets then expanded to over 20 countries including countries in Africa and South America.

Provimi later got acquired globally by Cargill the agribusiness Company of USA.

Mr. Bharat Tandon became the first Chairman of Livestock Industry Association-even though he was not from a 'Feed Manufacturing Company. This organization now known as CLFMA OF INDIA. It represents the interests of all livestock industry, including feed Cos., Poultry Integrators, Dairy industries including Co-Operatives and the Aquaculture industry. Govt. of India consults this association on several issues of policy formulation.

Currently, Mr. Bharat Tandon is the founder/Chairman of Fibroheal Woundcare (P) Ltd. (FWPL). A “start-up India registered Company dedicated to developing wound healing solutions utilizing silk as a bio-material. The Company has several patents in hand and in the pipeline all related to silk in non-textile applications.

FWPL has won several recognitions and awards, specifically “startup of the year” announced in the recent prestigious event Bangalore Bio 2020



CLFMA Award



Prof. V. Ramasubba Reddy

Retd Professor (LPM Avian), Agricultural University,
Rajendranagar, Hyderabad – 500030, Telangana State

- **Prof. V. Ramasubba Reddy, Retd.** Professor (LPM Avian), BVSc & AH from SV University, Tirupati in 1964, MSc (Vety.) from AP Agricultural University in 1970 & Ph.D. from Agra University in 1976.
- He worked in State Dept. of Animal Husbandry, Andhra Pradesh; IVRI and CARI, Izatnagar; APSMPDC, Andhra Pradesh; and Agricultural University, Andhra Pradesh.
- He got the scholarship from East Asiatic Co, Madras during MSc (Vety) prog and from UNDP during PhD prog.
- He got during his academic career OGPA of 4.00 out of 4.00 during Masters Program and best teacher and meritorious teacher awards. Also, he was the principal investigator in several research programs. He is a member of several scientific organizations.
- He was rated as a good teacher for UG and PG studies.
- He was involved as a major and associate guide for 32 students and published 185 papers including 68 Research Publications.
- The Hand Book on Nutrition and Feeding of Chicken (edited by Dr. Reddy) is popular among students and Industry.
- Prof. V. Ramasubba Reddy, 79 years of age, retired as Professor from Agricultural University, Hyderabad on 30 June 2002. Post and preretirement, he worked as Consultant in Poultry Management and Nutrition and in the nutrition of Dairy cattle, sheep and goat, pig and fish and prawn.
- He is having 57 years experience in livestock, poultry and aqua production.
- He says that his efforts for Animal Food Production and for nutrient economy during Livestock Production will be continued throughout his life.
- His positions and life are well supported by his Wife, Daughter and Son.



CLFMA Award



Dr. V. Sridhar

General Manager
National Dairy Development Board

Dr.V. Sridhar is a professional in the field of Animal Nutrition with experience of more than 23 years in applied dairy nutrition. He obtained his M.V.Sc degree in Animal Nutrition from the Andhra Pradesh Agricultural University, Hyderabad and a full-time M.B.A in General Management from the Sri Sathya Sai Institute of Higher Learning. Subsequently, Dr. Sridhar underwent training in advanced dairy nutrition in the USA and Europe.

Over the past two and a half decades, Dr.Sridhar has visited ten nations – counted as advanced nations in dairying - for understanding best practices in animal nutrition, dairy herd management and feed manufacturing. He has also participated in international conferences and symposia in the US, Europe, Asia and Brazil on topics ranging from climate change to feed quality management.

His work experience includes stints in the private and public sectors handling responsibilities ranging from applied R&D, technical services, product management and handling a feed manufacturing unit with P&L responsibility.

Currently he heads the Animal Nutrition Group at NDDB and is tasked with the development of scientific and practical solutions to the challenges faced by the dairy farmers in matters relating to feed and fodder. A few notable interventions are - the development of Total Mixed Ration (TMR) Pellets for feeding dairy cattle as well as the development of a 'Strategic Feeding Model' for improving profitability of dairy farming through the complementary usage of green fodder and concentrates.

Dr.Sridhar is a member of the FAD Council of the Bureau of Indian Standards (BIS) as well as the convener of the expert panel on feed ingredients. He is also an expert member of the National Programme for Organic Production of APEDA, Ministry of Commerce, Government of India. He is a member of the 'Action Team' on Heat Stress of the International Dairy Federation (IDF).



CLFMA Award



Dr. A. Natarajan

Tamil Nadu Veterinary and Animal Sciences University

Dr.A.Natarajan, MVSc., Ph.D is Professor and Head, **Animal Feed Analytical and Quality Assurance Laboratory**, Veterinary College and Research Institute, Namakkal, Tamil Nadu Veterinary and Animal Sciences University.

- Graduated in 1987, **Dr.A.Natarajan** mastered in Animal Nutrition (1991) and obtained his PhD (1998), from Madras Veterinary College, Chennai. He is totally involved in upgrading the 100 % self-financed Animal Feed Analytical and Quality Assurance Laboratory in testing of feed and feed ingredients for livestock and poultry, since 1996, on cost-effective basis, in line with University directions.
- Started, in 1994, in nation's biggest poultry belt, during the time of no facilities for testing, the laboratory, has gone miles to create infrastructure to analyze huge number of tests in shortest possible time with validated results being quickly dispatched in every possible way using its own **software-oriented LIMS**, meant to accommodate data on customers, results, accounts and so on.
- He and his team strengthened the lab to process 25,000+ samples and 60,000+ tests per year and is instrumental in expanding the clientele to more than 6000, from all corners of the Country.
- He and his team facilitated obtaining the prestigious **ISO/IEC 17025: 2017 NABL accreditation** in 2017, the first institute to do so for the University.
- His perseverance with Service Tax department resulted in **inclusion of exemption of Service Tax to feed testing** in 2013 for the entire nation.
- The lab participates yearly in international proficiency tests jointly conducted by **Texas A&M University and FAO for Aflatoxin B1 with Z score of < 2.0** and national PT providers for major parameters.

- A residue testing facility for antibiotic and toxic minerals in chicken, egg and milk has been set up with **Rs. 400 lakh funding from APEDA**, Ministry of Commerce and Industry, GoI, and other quality parameters for poultry entrepreneurs.
- He is **Principal Member of FAD5 of Bureau of Indian Standards**.
- He **guided 3 masters and one PhD student in Poultry Nutrition** and is post graduate teacher.
- He was associated in many research projects and is currently involved in joint **UK-India multidisciplinary project on Anti-Microbial Resistance in broiler meat**.
- His **focus is to move forward to expand the residue testing facility**.
- His **priority is to safe-keep the laboratory and its staff** on secure and safe environmental norms.
- His **aim is always to upkeep the integrity with impartiality** in every aspect surrounding the analyses.





Ms. Prerana Desai

Head of Research, Samunnati Agri

Ms. Prerana has a vast experience of commodity research of more than 25 years. She specializes in Agri Commodity Research. As a part of her vast experience she has done commodity research for various value chain participants like manufacturer, trader, exchange, commodity broker, NBFC and now farmers. Samunnati Agri enterprise consist of all those business entities offering products as well as services pertaining to inputs, production, transportation, processing and marketing in agricultural as well as allied sectors such as animal husbandry, fisheries, poultry, forestry and so on. Samunnati Agri offers solutions to cater to the needs of value chains operating in the agricultural space. Samunnati follows Aggregation, Market Linkage, as well as Advisory services (AMLA) approach. Samunnati facilitates market access through financial and non-financial solutions that enable the enterprises and associated value chains to operate at a higher equilibrium, thereby creating value for all stakeholders. SamAgr is the Advisory service that is also available for consultation at a fee.





Mr. Unupom Kausik
President, NCML

Unupom Kausik serves as the President at NCML. He brings in a wealth of experience for having worked in the commodities domain for almost a decade out of his overall experience of more than 25 years. His skill sets comprise risk management, commodity trading, logistics & supply chain management, building online marketplaces, financial services, hedging and derivative advisories on commodity exchanges, procurement and international trading of agriculture commodities such as cotton, oilseed and feed complex, managing large and complex supply chains for integrated textile operations.

He is an Electrical Engineer with Post Graduation in Rural Development from the Institute of Rural Management, Anand (Gujarat), and has a Fellowship in International Cotton Trade."





Balram Singh Yadav

Managing Director, Godrej Agrovet Ltd.

Balram Singh Yadav is the Managing Director of Godrej Agrovet Ltd. (GAVL), one of India's foremost diversified agribusiness companies. He also serves as Managing Director of Godrej Tyson Foods Ltd. Besides, he is a Director of numerous firms including ACI Godrej Agrovet Pvt. Ltd. - Bangladesh, Creamline Dairy Products Ltd. - Hyderabad, Astec Lifesciences Ltd, and Godrej Maxximilk – Mumbai. He has been the Chairman of CLFMA of India (Twice), an Association of Livestock Industry.

Balram began his career with Godrej in 1990 and over the years, he has handled roles of increasing responsibility across businesses and regions in the company. He became the business Head in 1999 when he was asked to establish & lead the Poultry Business. He established the Real Good Chicken and Yummiez as the leading processed poultry brand in India.

In 2007, he took over reins of Godrej Agrovet Ltd. as Managing Director. As his first challenge, he successfully led the turnaround of GAVL, which was then a loss-making entity and put it on the path of rapid growth. In 2017, Balram was instrumental in taking the company GAVL public. The public offer received record response & was subscribed over 96 times.

A raconteur par excellence, Balram inspires his team with incredible stories from his rich experience in the field, only when he's not driving them to deliver their best. He's also an active angel investor mentoring a slew of next-generation entrepreneurs.

Balram completed his BSc (Hons) in Agricultural Science at Haryana Agricultural University, where he ranked 2nd in his class. He earned his MBA from IIM-Ahmedabad. He lives in Mumbai.





G. Chandrashekhar: Economist
Senior Editor and Policy Commentator

G. Chandrashekhar: Economist, Senior Editor and Policy Commentator.

G. Chandrashekhar is a global agribusiness and commodities market specialist with decades of rich experience. He provides policy inputs for the Indian government through his newspaper columns, talks on business television and personal interaction with policymakers. Some of his key focus areas include: Food and nutrition security, role of technology in agriculture, trade and investment opportunities, global and Indian commodities market outlook and so on.

Chandrashekhar holds many public positions. Currently, he is:

- Economic Advisor, IMC Chamber of Commerce and Industry
- Independent Member, SEBI Commodity Derivatives Advisory Committee and SEBI Research Advisory Committee
- Consultant, UN International Trade Centre, Geneva
- Member, Expert Committee on Agribusiness and Rural Development, Dr. Rajendra Prasad Central Agricultural University
- Resource Person for FAS-USDA in India for over three decades.

He can be reached at: gchandrashekhar@gmail.com and +919821147594





Mrugank Paranjape

Managing Director & Chief Executive Officer
of NCDEX e Markets Limited

Mrugank Paranjape, is the Managing Director & Chief Executive Officer of NCDEX e Markets Limited, the Non Executive Independent Director in the Central Board of the State Bank of India, the Chair of the Board of the Mumbai School of Economics & public Policy and a Trustee on the Board of Sewa International.

Earlier, he was a Senior Partner with Alpha Alternatives, a boutique alternative asset manager. In May 2019, he completed his 3 year term as the MD & CEO of the Multi Commodity Exchange of India (MCX) - where he was instrumental in the resurgence of MCX following its troubled legacy and re-established the brand as well the leadership position of the Exchange.

From 2005 – 2016 he worked with the Deutsche Bank Group. In his last role, he was the India Head of DB Centre - the front office offshoring centre of Deutsche Bank. Earlier he held several leadership positions in India and Singapore in Deutsche Banks's Global Transaction Banking division. In 2012, he was awarded the "Custodian Banker of the Year" by the Asian Investor Magazine.

Mrugank has earlier worked with ICICI Prudential AMC, Reliance Logistics, India Infoline, W I Carr, ING Barings, IIT InvesTrust & Citibank.

He is an alumnus of IIT Mumbai (B Tech, Electrical Engineering) and IIM Ahmedabad (PGDM with Specialization in Information Systems).





B Soundararajan

Founder and Chairman
Suguna Group

Born in 1961, Mr. B. Soundararajan is a first-generation entrepreneur, whose life's motto has always been the same from the beginning, which is to enrich the lives of rural India. Originally hailing from Udumalpet, a town not far away from Coimbatore, Tamil Nadu, he went on to found Suguna Group of Companies along with his younger brother Mr. G.B. Sundararajan.

He currently serves as the Managing Director at Suguna Holdings Private Limited and as a Director in its subsidiaries including overseas Companies.

Suguna is one of the pioneers in the country to start the contract farming in poultry industry which reshaped the country's poultry farming and also created a robust and effective system in poultry management. Mr. Soundararajan's business interests lie in poultry, animal healthcare and dairy segments. He has globalized Suguna Group's business activities by setting up business ventures abroad. The current overseas subsidiaries are located in Sri Lanka, Bangladesh and Kenya. Each year, he studies the economy of various countries and looks for potential business opportunities. He is an efficient strategist and an able executor who could convert ideas into action spontaneously.

Under his leadership, Suguna Foods has provided livelihood to 39,000+ farmers and has been ranked 3rd in Asia's top poultry producers list and also ranked as the 9th largest poultry company globally. Being the market leader in the broiler business in India, Suguna is also the 1st Asian poultry company to implement Enterprise Resource Planning (ERP) to manage its operations.

The founder has been instrumental in raising the living standards of poultry farmers since Suguna's inception. He provides direct/indirect livelihood support to more than 2 lakh people across India through the concept of 'Poultry Integration'. Moreover, with efficient business models, he has also made the broiler chicken an affordable source of protein for the common people of India. This way, Suguna Group is playing an important role in ensuring the food security of our country.

Mr. Soundararajan has won numerous awards for his works. He won the Best Performance Award from National Productivity Council, New Delhi—7 times in 8 years; Young Entrepreneur Award from CII; Lifetime Achievement Award from TIE, Chennai; Asian Livestock Industry Award from Malaysian Government. Innovator to the core, Mr. Soundararajan pioneered the concept of 'Contract Farming' in India. Through his innovative business concepts, he reduced the number of cost centers from 14 to 4 at Suguna Foods businesses. Under his guidance, Suguna has so far distributed more than 45 lakh trees saplings and donated educational aids to many schools in rural areas. He also set up the Suguna Institute of Poultry Management (SIPM), a non-profit organization and a partner in the Skill India program. Every year, SIPM trains youngsters of rural areas, transforming them into successful entrepreneurs and skilled employees in the poultry industry.





Mr. Bahadur Ali

Founder & Managing Director, IB Group

A man of the people, Mr. Bahadur Ali, has been a visionary leader, successfully leading IB Group through its capricious journey. Called as a “Father of Modern Indian Poultry”. He envisioned the easy availability of Protein as an eminent source of nutrition at an affordable price to Indian population. Mr. Ali has led IB Group through numerous business expansion plans and international partnerships. He conceived the importance of quality feed for the birds for their better growth and performance thereby entering into Poultry Feed business. He deployed resources intelligently to boost integrated poultry culture amongst his associated poultry farmers. His journey from once a remote village of Rajnandgaon as a small-scale poultry merchant to the protein and agri conglomerate which is globally recognized and has put Rajnandgaon and Chhattisgarh state on a Global map supported agriculture and rural development not just in Chhattisgarh state but all across India. Driving the education CSR for the underprivileged by educating 7500 children under AZIZ Public School and AZIZ Trust. Making the future of the country strong by empowering the children with education with no cost to them.





Mr. Rahul Kumar

MD, Lactalis India

Mr. Rahul Kumar is working as a MD of Lactalis India & managing 3 companies, Tirumala, Anik & Prabhat. Lactalis is the largest dairy group in the world having annual turnover of 23 billion USD. Previously he has worked as a MD, Amul Dairy for 11 years from 2003 till 2014. Mr. Rahul Kumar has versatile experience of 29 years in Dairy. After graduating with a degree in chemical engineering from Indian Institute of Technology, Roorkee, he was chosen for a management course at the Institute of Rural Management Anand, after which he joined Amul. In 2003, at the age of 33, Rahul became Managing Director in Amul Dairy. He has been instrumental in entry of Groupe Lactalis to Indian dairy market. Under Mr. Rahul Kumar leadership Groupe Lactalis has acquired 3 companies in last 7 years in India. He has keen interest in technological & IT intervention to improve efficiencies across value chain. He has worked extensively in the areas of cattle feed, animal nutrition and animal health.





Shri. Tarun Shridhar,
Retd. IAS, Former Secretary AH & D

Shri. Tarun Shridhar IAS (1984) Retd. IAS Former Secretary Animal Husbandry & Dairying - His brief updated introduction is that after retirement from the IAS, as the Secretary, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, He was a Senior Adviser with the NCDC for about eight months. Subsequently, he has been appointed as Member of the Central Administrative Tribunal (CAT); He is posted in Allahabad these days.

A former IAS officer of the 1984 batch of Himachal Pradesh cadre.

Retired in July, 2019 as Secretary to the Government of India (GoI) Ministry of Animal Husbandry, Dairying & Fisheries. Presently Member, Central Administrative Tribunal. More than 35 years' experience in high positions of policy making and implementation.

Prior to holding the position of Secretary, Government of India, he was Additional Chief Secretary in the Government of Himachal Pradesh. As Additional Chief Secretary, he looked after diverse sectors and departments such as Power, Personnel, Revenue, Environment and Forest, Horticulture, Industries, Animal Husbandry, Fisheries, etc.

He has earlier held the position of Joint Secretary in the Department of Animal Husbandry, Dairying & Fisheries, Government of India for 5 years. Nearly ten years of combined experience in the state and central governments in Animal Husbandry, Dairying and Fisheries sectors.

Deputy Commissioner of Mandi and Bilaspur districts; SDM Kangra; Assistant Commissioner Development, Pacchhad; Managing Director HP Tourism Development Corporation and Himachal Road Transport Corporation

More than 100 articles, both in English and Hindi published in reputed publications such as the Indian Express, The Tribune, Outlook, Dainik Jagran, Dainik Bhaskar and myriad technical journals on the subjects of Sustainable Development, Agriculture, Rural Development, One Health, Dairying, Pastoral Economy, Livestock Management, Fisheries, Disaster Management etc.

Regular participant in international and national technical workshops on Animal Husbandry, Poultry, Dairy, Fisheries and allied sectors as a resource person and keynote speaker.

A varied 360 degree experience, knowledge with innovative initiatives in various fields of industry, infrastructure, education, public welfare, administration, governance reforms, policy and implementation.





Dr. Beeda Masthan Rao

Founding Chairman and Managing Director
BMR Group
Father of Vannamei in India

Dr. B. Masthan Rao, the founding Chairman of BMR Group of Industries is a man of humble beginnings. Fondly known as BMR, Mr. Rao began his seafood journey in 1991 in his hometown, Iskapalli with "Seed Culture." Today, almost 30 years later, the group has expanded into a conglomerate of Multiple Seed Hatcheries, Shrimp Processing facilities, Feed manufacturing facilities and Exports to major international cities. BMR Group established India's First Broodstock Multiplication Centre in the year 2019. BMR group is known to be one of the most respected and sought-after groups in the seafood industry.

Dr. B. Masthan Rao is popularly known as the "Father of Vannamei Farming in India" for pioneering the use of *Penaeus Vannamei* in 2004. From being the first individual who introduced India to a new species called "L. Vannamei" to establishing India's first ever Broodstock Multiplication Centre. Mr Rao's contributions to the Indian Seafood Industry have changed the face of the industry. His contributions introduced the rural aquaculture farmers to international markets opening more revenues for the industry that led to a meteoric rise in India's shrimp production.

Dr. B. Masthan Rao was awarded the Doctorate (Aquaculture) by the International University of Contemporary Studies for his extraordinary contribution to Aqua Industry in the year 1998. The group bagged the "Best Hatchery in India Award" by the MPEDA, Govt. of India in the year 2014, and is also regarded as the largest seed supplier in the entire country. Mr. Rao was also awarded the "Indian of the year Award" in the year 2017 in recognition of his achievements that have contributed towards building the reputation of our Country.

"His goal was always to give back to farmers, who have been the backbone of this industry. We are a vertically integrated group of companies that aims at providing end to end solutions to aqua farmers. With the highest degree of transparency and honesty in our services, we believe that we can exceed our customer's expectations with processing, distribution and marketing safe and quality shrimp products. I will always strive to take the Aqua Industry to greater heights." Proudly concludes Dr. Rao.

BMR attributes its success to their ability to update themselves with the ever-growing trends in the industry, its prestigious clientele and their ever-committed workforce. BMR Group's business plan and success mantra has remained the same.



FEEDING THE GROWING LIVESTOCK POPULATION: CURRENT & FUTURE CHALLENGES

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INTRODUCTION

Growing at this pace, the world population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100. Over the next few years, cereals, vegetables, milk, and meat production must almost double to meet the needs of the world population. From a global perspective, an increase of 17 % in consumption in total animal-sourced protein is predicted in 2050. Increases as high as 50.8% and 56% are predicted for red meat protein consumption in African and Southeast Asia regions, respectively. However, if this level of per capita consumption is maintained to 2050, the global average demand for total animal-sourced food products approximately will increase from 1.4 billion tonnes to 2.0 billion tonnes. Moreover, the expected increase in per capita demand, particularly in the currently less developed regions (Adesogan et al., 2020). Moreover, FAO studies explained that there was a significant difference in levels of consumption across regions from 10.3 kg/capita per year in the African region to 48.8 kg/capita per year in Europe during 2017. The range in the level of consumption across regions is very pronounced with dairy, from 56.5 kg/capita per year to 443.5 kg/capita per year in Asian and European countries, respectively. Still, drastic variation in consumption pattern was recorded in egg consumption, European countries continue to have the highest consumption of 10.6 kg/capita per year, while African regions have the lowest consumption of 1.7 kg/capita per year (Henchion et al., 2021).

Globally, poultry meat is expected to represent 41% of all the protein from meat sources in 2030, and other meat products shares are comparatively lower viz beef (20%), pig meat (34%), and sheep meat (5%). The shifting towards poultry meat consumption has been increased in lower-income

developing countries this reflects the lower price of poultry as compared to other meats, while in high-income countries this indicates an increased preference for white meats which are more convenient to prepare and perceived as a healthier food choice. This has put pressure on the livestock sector to maximize milk and meat output sustainably.

Feeding growing Livestock Population

India has the world's largest livestock population accounting for over 37.28 percent of cattle, 21.23 percent of buffalo, 26.40 percent of goats, and 12.17 percent of sheep of the world's population. As far as livestock population, In India, the 20th Livestock census detailed out there was an increase of 1.0% in total bovine population (302.79 Million in 2019) of Cattle, Buffalo, Mithun, and Yak, over the previous 2012 census. Like that, the Sheep and Goat population in the country showing an increase of 14.1 percent and 10.1 percent, respectively. Total Commercial Poultry in the country is 534.74 Million in 2019, increased by 4.5% over the 2012 Census. Interestingly, there was a 45.8% increase in total backyard poultry in the country and the population was 317.07 Million in 2019.

National Dairy Development Board (NDDB), estimated demand for 2030 at and all India level is 266.5 million metric tonnes for milk and milk products.

Milk production in the country has increased from 146.3 million tonnes in 2014-15 to 198.4 million tonnes in 2019-20. Further to that, the per capita consumption of dairy milk in the urban areas (592 ml) remains higher than the rural areas (404 ml) in the 2030 projections.

Challenges: Current and Future

In this context, the livestock sector facing tremendous demand for milk and meat. Meanwhile, feeding the growing livestock population is a difficult issue to be answered at this moment. Nevertheless, there will be a lot of challenges to feed the growing livestock population at economically viable, environmentally friendly, and socially responsible in a sustainable manner. Several factors influence the economical viability of the feeding system which is driven by demand and supply of input resources like feed and fodder, market demand, profit variations in different livestock production systems.

Other challenges considered are environmentally friendly and socially responsible feeding at a sustainable level. The developed countries claimed the emissions per unit of food produced are generally higher in ruminant feeding systems maintained at extensive management systems. India, the largest bovine population and continues to be the largest producer of milk in the world. According to Adesogan et al. (2020), to produce average US dairy cow milk production in a year (10 000 l), at Indian condition about eight dairy cows (producing an average of 1 200 l annually) would be required, that will generate nine times as much methane. In this regard, GHG mitigation strategies have been shown to reduce emissions by up to 30% (FAO, 2012) and in intensive dairy farms to as low as 1 kg of CO₂ equivalents/kg of energy corrected milk, compared with >7 kg of CO₂ equivalents/kg of energy corrected milk in extensive systems (Knapp et al., 2014).

In regions, where Green House Gases (GHG) emissions per unit of food produced are generally higher, sustainable intensification will require practices such as feeding energy-dense, nutritionally balanced rations, fertility management, improving genetics, decreasing herd size to retain only productive animals, using appropriate mechanization, heat abatement and improving herd health.

The very important debate or challenge sharing of cereals and proteins sources required for human food preparation utilized for feeding the livestock population. On a global basis, mono-gastric diets

typically comprise wheat, maize, and soya bean meal while ruminant nutrition is dominated by locally grown forage feeds such as grass and crop residues (Wilkinson and Lee, 2017). While comparing the feed raw materials that are used for human consumption, the highest ratio of between 37.1 and 44.3 kg human-edible feed/kg protein product is utilized by the cattle feed lots to produce milk or meat. That, for industrial pigs, layers, and broilers, ratio of 13.8 to 20.0 kg of human-edible feed/kg protein production. However, grazing ruminant systems have a substantially lower demand for human-edible feed. Consequently, in a global context, producing 1 kg of boneless meat requires an average of 2.8 kg human-edible feed in ruminant systems and 3.2 kg in mono-gastric systems (Mottet et al. 2017). Further, it was reported that human-edible feed represents about 14% of the global livestock feed ratio.

The differences in production systems between and within monogastric and ruminants have important implications for approaches to enhance sustainability. Growth in chicken production globally has been in intensive units specialized in meat or egg production, rather than in backyard systems that tend to raise dual-purpose birds for home consumption and local sale. In contrast, the highest population growth was registered in the backyard poultry system which stabilizes the rural livelihood of the Indian population. Whereas, Pigs production system in a variety of settings, from small family units through small- to medium-sized commercial, semi-intensive units, to very large intensive units.

In the Indian context, very particular to the dairy sector, feed and fodder availability and their costs are the most important contributing factor decides upon the growth of the sector. It is estimated that feed and fodder account for 60-70 % of total cost in livestock production. There is a projected deficit of 47.13 percent of Crude Protein and 35.19 percent of Total Digestible Nutrients (TDN) during 2025. Further, it was estimated that there will be a deficit of dry fodder (21 %), green fodder (40%), and 38 % concentrates during 2025.

It is strongly recommended to follow the measures discussed here to overcome the issues in feeding dairy animals. The dairy production system ensures

efficient use of available feed resources by implementing Precision farming practices and farmers should have thorough knowledge about the quality of the conventional and alternative non-conventional feed resources available at their places. The government/other interested stakeholders should integrate national level feed inventories and Ration formulation Application software in local languages to the progressive dairy farmers to promote the use of agro-industrial by-products/bio-fuel by-products that not competing with human edible sources. Moreover, certified fodder seed production and entrepreneurial approach need to be considered for better quality fodder and fodder silage production system. Further to that, feed losses could be reduced by adopting proper post-harvesting technologies, feed processing technologies like densified complete fodder blocks, simple methodologies like chopping of forages, and practicing feeding of a total mixed ration.

Compare to other mono-gastric animal feeding systems, the challenges faced by the poultry industry will be different. India is the third-largest egg producer in the world after China and the USA and the fourth-largest chicken producer in the world after China, Brazil, and the USA. The question of feeding this increasing population of meat and egg-producing poultry at economic viability in a sustainable manner will be a great challenge. The challenge of curtailing production cost relied upon feed cost which constitutes 70 to 80 % of the total production cost. The cost of feed production cost depends on the availability of raw materials like maize and soybean meal which never reaches the demand of the poultry industry. Meanwhile, there are no alternative protein sources available either and production facilities and methodologies followed by the poultry farmers in India are not in line with international standards.

The measures proposed here are to overcome these challenges are to increase utilization of structural carbohydrates and phytate phosphorus from agro-industrial by-products, cereals other than conventional raw materials by using feed additives viz enzymes, yeast, probiotics, prebiotics, and essential oil, etc in the latest novel delivery system using nano-technology. Currently, banning/regulating the use of antibiotic growth

promoters in poultry feed formulations to improve feed efficiency and alternative antibiotic growth promoter availability and cost-effectiveness decides the industry viability. In the coming years, issues relating to animal welfare and environmental pollution by poultry units have been of increasing concern. Many products of such nature as probiotics, gut acidifiers, immune-modulators, eubiotics, organic acids, etc. are available in the market but need further research. Ensuring safe food is paramount for the protection of human health and enhancement of the quality of life. Safe food plays an important role, whether domestically produced and consumed, imported or exported. European countries preferring cage-free poultry eggs and meats considering animal welfare.

The value addition of poultry plays an important role in increasing the profits and maybe through nutritional manipulations, processing, and transgenesis. Omega-3 enriched eggs and meats are available in the market for premium price developed by nutritional approaches and fortification of Zinc and Vitamin B12 in chicken egg and meat through dietary supplementation need commercialization. The transgenesis biotechnological approaches, wherein the gene (interspecies) responsible for a specific trait can be achieved.

CONCLUSION

Ultimately, a global perspective reference diet was defined for the health of the consumer per day comprises 14 g red meat, 28 g poultry meat, 250 g daily, and 13 g eggs and modeling exercise projected would keep climate change within the boundary they set (4.7–5.4 Gt CO₂–eq/year) in the year 2050. Moreover, the significant investment and research to replace conventional animal protein sources from bovine and poultry by considering in vitro/cultured meat, insects, seaweeds, and single-cell proteins (also called microbial proteins) derived from cultures of algae, yeasts, fungi, or bacteria as human food vis-a-vis will challenge the livestock product cost. The other way meat substitutes based on plant protein primarily, and reduced meat or hybrid (blend of animal and plant-sourced proteins) products are increasingly available.



FEEDING OF SUGAR INDUSTRY BY-PRODUCTS FOR THE GROWING LIVESTOCK POPULATION

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Feeding the major challenge for most dairy farmers. Poor feed management has led to late age at first calving, which contributes to a reduction in the number of dairy cows, consequently reducing herd productivity and animal lifespan. Sugar industry by-products may be a potential feed source for cattle in subtropical and tropical areas. Nowadays, there is great political and social pressure to reduce the pollution arising from industrial activities. Almost all developed and underdeveloped countries are trying to adapt to this reality by modifying their processes so that their residues can be recycled. By-product feedstuff in the diets of ruminants support growth and lactation and result in the production of human edible food. An intensive feeding system based on locally available sugar industry by products is an alternative promising was feeding system to rear ruminants economically. Sugar cane industry by- products includes Bagasse, Pressmud, Molasses, Sugarcane tops, Sugar cane juice and Condensed molasses solubles/ dried yeast culture/ yeast sludge.

1. Bagasse

Bagasse is the fibrous product resulting from the crushing of cane sugar in the extraction or direct transformation of alcohol. The fiber in cane sugar contains about 40% cellulose, 35% hemicellulose and 15% lignin. For each 10 tonnes of sugarcane crushed, a sugar factory produces nearly 3 tonnes of wet bagasse. Bagasse is a good source of cellulose and it has been used successfully as roughage for ruminants. Amata (2014) reported that the sugarcane bagasse can be used as exclusive source of roughage for beef cattle.

Chemical composition of Sugarcane bagasse (%DMB)

Nutrient	Level (%)
Dry matter	50.3
Crude protein	20.0
Ether extract	5.80
NDF	78.4
Acid detergent fiber	63.9
Non-fibrous carbohydrates	72.1

The following precautions need to be taken while feeding bagasse:

1. Avoid usage of fungus affected bagasse and spoiled molasses.
2. If urea is used in the feed, care should be taken to mix it uniformly in the diet.
3. In case, molasses is diluted, such feed should not be stored.
4. Bagasse feed is to be introduced slowly as the animals take some time to adapt to it.
5. Adequate water should be made available to the animal.

2. Press mud/Filter cake

The filter cakes use in animal feed must be dried in the sun or in special dryers (hot air or steam) until it gets to 12% moisture. Its production ranges from 20-40 kg per tonne of processed sugarcane. Press mud can be used in the formulation of the livestock

feed. Because it has a higher CP content than molasses and contains more soluble calcium, which is an important constituent of animal feed. Fresh and dried filter press mud may be used to supply about 20-30% of the dry matter requirement of livestock by feeding in the concentrate mixture of fodders.

Pressmud composition (%DMB)

Nutrient	Level(%)
Moisture	5.60
Crude protein	10-15
Ether extract	7-11
Crude fibre	12-20
NFE	40-43
Ash	15-25

3. Sugar cane juice

It contains about 15-16% soluble carbohydrate, 1-2% ash and 80-85% water. It may be used to replace molasses for enhancing fermentation in ensiling. Sugar cane juice is easily available with the farmers and they can save time required for obtaining molasses. Dehydrated sugar cane juice is used for the supply of energy in the diets of calves, pigs, poultry and lactating animals.

4. Molasses

Molasses is a by-product or end product of sugar cane or sugar-beet resulting from the manufacture of raw or refined sugar. It is a viscous liquid and heavily condensed to separate into a low degree, of which not all of sugar can be crystallized by the usual processes. Molasses has been used widely as a food supplement in the diet of ruminants. Molasses contains an average of 5% protein, but is rich in energy, and a very palatable laxative. Molasses is

the readily available source of sugar and phosphorus to the animal body. 10 to 15% molasses added in concentrate mixture. It has enhanced the palatability of the concentrate mixture.

Proximate composition of the molasses (%DMB) (Sindhu *et al.*, 2002)

Nutrient	Level(%)
Water	20.6%
Sugar	60.8%
Crude protein	3.2%
Ash	8.2%
Energy (ME) Mcal/kg	2.5-2.6

Benefits in animals

Molasses is an energy supplement used in order to stimulate consumption in feed for ruminants. Molasses can reduce the dusty powdery nature of some finely ground feeds. In this role, it makes a feed mixture more palatable and edible to livestock. Molasses stimulates the activity of microorganisms in the breakdown of cellulose and is good source of trace minerals (Carolina *et al.*, 2013). Molasses can be an excellent binder for making up rations and is a good solvent for urea, vitamins and other ingredients.

5. Sugarcane tops

Sugarcane tops are palatable and cattle can be maintained entirely on them with a little supplement of concentrate mixture or leguminous feeds. Cane tops can be converted into a good quality silage or hay for feeding during scarcity of fodder. Sugarcane tops with or without leaves have good feeding value and are readily accepted by ruminants fresh, dried or ensiled.

The chemical composition and Digestibility of fresh sugar cane tops (on as such basis)

	Dry matter (%)	Crude protein (%)	Ether extract (%)	Crude fibre (%)	NFE (%)	Ash (%)
Proximate analysis	24.8	1.9	0.5	7.7	14.5	2.2
Digestibility	58.0	55.0	50.0	60.0	65.0	-

6. Condensed molasses soluble/ dried yeast culture/ yeast sludge

Condensed molasses soluble/Dried yeast sludge is a by-product of various fermentation processes in which large quantity of molasses is used to produce alcohol, yeast, citric acid, monosodium glutamate, etc. This product is a rich source of microbial protein and is useful ingredient of animal feed. After condensation to 65 to 75% dry matter, it is called the condensed molasses soluble. It is dried at higher

temperature (130-135°C) is more digestible than fresh and condensed products.

Conclusion

The use of by-products of sugar cane industry have nutritional characteristics suitable for inclusion in the diet of ruminants, nutrition is feasible, since the feed has 70 to 75 % of production costs.



LIVESTOCK IN INDIA: FACTS, MAJOR CHALLENGES AND OPPORTUNITIES

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Livestock is an important livelihood source for over two-thirds of rural communities and 16% of small farm households in India, employing about 8.8% of the population in India. The livestock sector contributes 4.11% GDP and 25.6% of total Agriculture GDP. It is an essential source of nutrient-dense animal source food and income for such households. At the same time, with the ever-increasing population, urbanization and economic progress, the demand for livestock products are rising at an exponential rate. The dietary demand of a growing population is the basic need, and it can only be achieved by increasing livestock production potential. Though the per capita availability of milk in India has increased to 375 g/d, it still stays behind in terms of egg and meat production in meeting the ICMR recommendations. The developing countries demand for meat and milk from 2005 to 2050 is projected to increase to 107 and 5.5 million tons. In light of these facts, there is a need to understand the multifaceted challenges that the livestock sector is facing; and bring out solutions for the same.

Major Challenges

1. Availability and supply of quality feed and fodder around the year for the livestock growth and production.
2. Reproductive diseases, poor animal health management, late sexual maturity, novel biomarkers for improving production and reproduction efficiency of dairy animals.
3. Shortage of high genetic merit bullsemen supply, and slow rate in the growth of artificial insemination coverage.
4. Conversion of unorganized to organized livestock sector to improve on clean and quality of livestock production.

5. The outbreak of diseases compromising the reproduction and production capacity of animals, shortage of vaccines and diagnostic tools.
6. Influence of changing climatic conditions on the growth livestock sector.
7. Lack of financial support and policy concerning the size of the livestock sector in India.
8. Changes in national and international regulatory requirements other governmental actions on livestock sector.
9. Wide gap between the farmers and academics for the transfer recent technologies in the livestock sector.

Opportunities:

1. Exploration of alternative/ newer feed resources. Developing and adapting the newer technologies like AFEX, to improve the nutritive value of unconventional feeds to narrow the gap between supply and demand of feed and fodder for the growing livestock population.
2. Advancement and adaptation of economical precision feeding modules to achieve the maximum production potential of the livestock.
3. Introduction of newer feeding strategies like the inclusion of probiotics, prebiotics, and natural immunomodulators in livestock rations to augment their health. The value addition of milk and milk products through dietary interventions.
4. Educating farmers regarding newer

technologies, balanced ration formulation, animal health management, clean and quality livestock production.

5. Multiplication of elite bulls and milch animals through genomic selection and modern biotechnological tools like cloning and assisted reproductive technologies and availability of quality semen/Sexed Semen /Transgenic /Genome editing.
6. Development of climate-resilient and improved housing and management tools for enhanced economic returns from dairy animals' production systems.

The role of livestock in maintaining or improving the national economy is getting recognized by policymakers. Furthermore, the revolution in the agriculture sector with livestock controlling a quarter of the agriculture gross domestic product requires special attention to the major challenges and the opportunities. Nonetheless, the maximum growth potential of the Indian livestock sector is possible when there is the dissemination of the solutions through a scientific approach, adaptation of the same at the root level with the support of the government policies.



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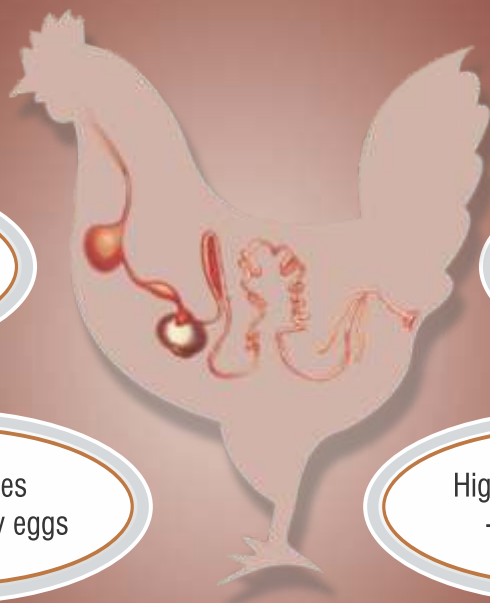
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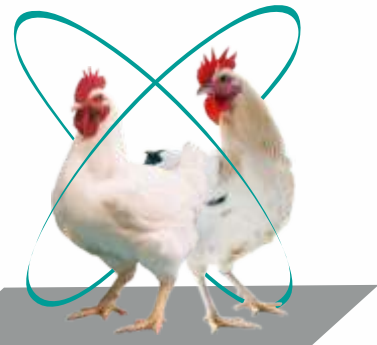
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