

# LIVESTOCK TECHNOLOGY

Pulse of Livestock Industry

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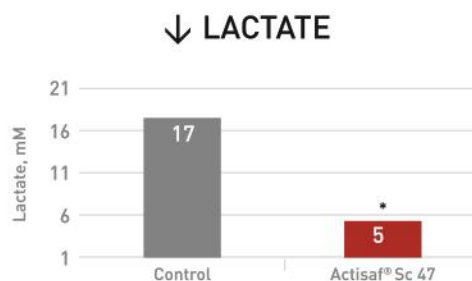


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1. Menden et al., 2008. Heat stress live yeast diet from sodium bicarbonate to stabilize ruminal pH in high-yielding dairy cows. J. dairy Sci. 91: 3528-3535.  
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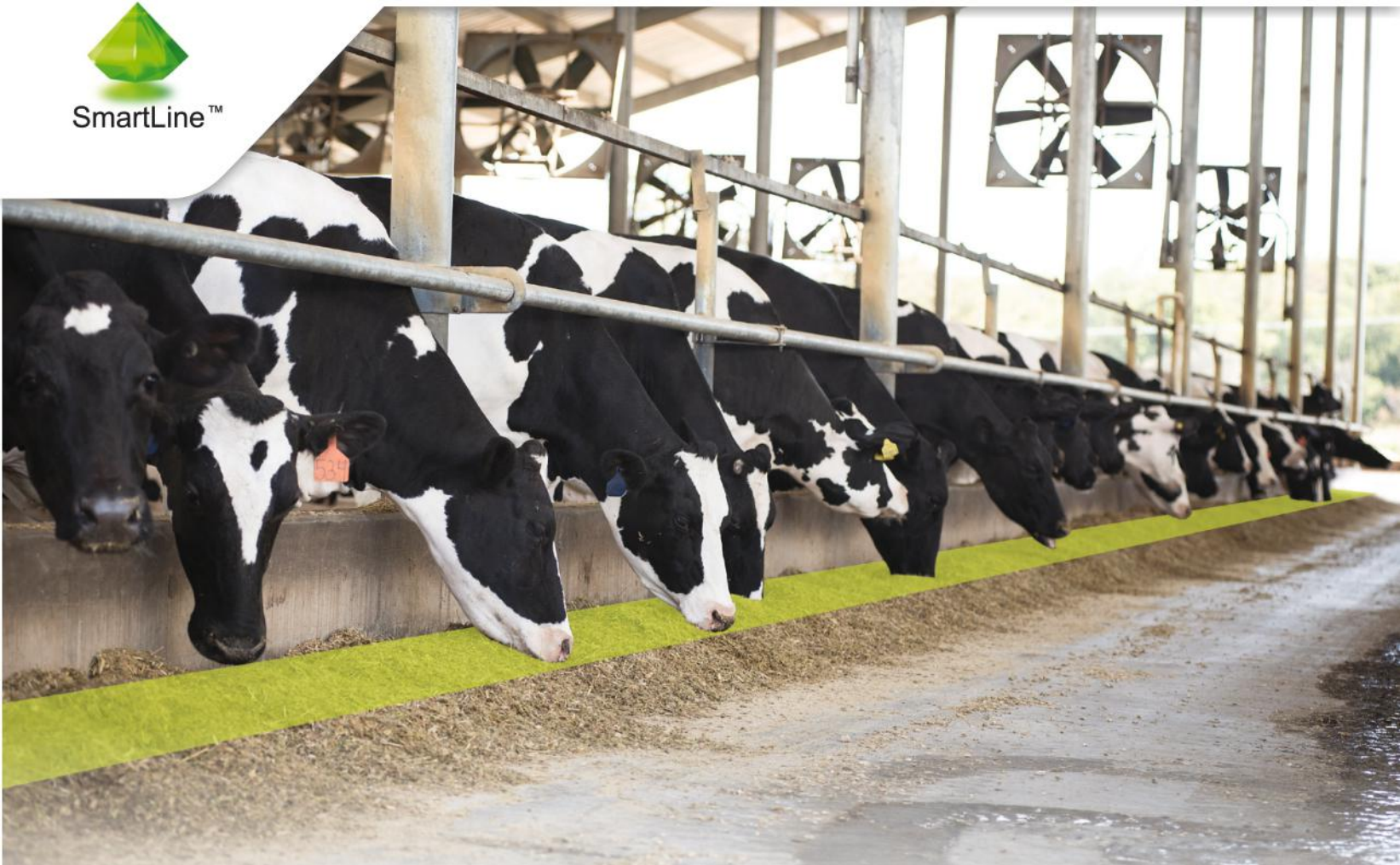
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02

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03

## A favourable Monsoon will help Agriculture and Allied Sectors by 6%

As per NitiAayog's Member Ramesh Chand, India's agriculture and allied sectors may register growth exceeding 6 per cent in 2024-25 owing to a favourable monsoon prediction and the previous year's low base. Monsoon regional distribution forecasts are encouraging and healthy. Agriculture growth in 2023-24 was 0.67 per cent. The India Meteorological Department (IMD) has predicted an "above normal" monsoon, at 106 per cent of the long-period average (LPA) of 87 cm, while private weather forecaster Skymet has said the monsoon is likely to be "normal" at 102 per cent of the LPA. "Real prices" of agriculture have been rising for several years. The wholesale price index (WPI) of agri-commodities is growing faster than non-agri-commodities. Adding stability in maintaining prices is required due to this aspect. Some see the government's action to maintain stability as a move to bring down prices. We should boost exports of surplus production of certain crops because of bumper Kharif output.

Insurtech firm IBISA has announced the launch of the Heat Stress Solution, which utilises advanced climate metrics and satellite technology to protect dairy farmers. This unique solution serves as a lifeline for dairy farmers across India by offering compensation for revenue losses incurred due to heat stress. Milk yields are estimated to decline by 30-35 per cent during severe heat waves. Since its introduction in 2024, the Heat Stress Solution has already safeguarded over 100,000 livestock within a mere fortnight, spanning 14 districts in Kerala. Furthermore, the product is currently operational in select districts of Maharashtra, Uttar Pradesh, Madhya Pradesh, Rajasthan, and Gujarat. IBISA anticipates expanding its reach in the coming months through collaborations with multiple milk unions and key partners within the dairy value chain.

eFeed, a precision animal management and nutrition company, has launched a research platform to fuel innovation in sustainable dairy practices in the country. The new platform has been designed to address critical challenges in the dairy industry, such as increasing methane emissions from cattle, the detrimental use of urea in cattle feed affecting soil health, and the consequent depletion of groundwater levels.

Moneyboxx Finance Ltd, which finances livestock farmers, has cumulatively disbursed over ₹1,200 crore as of March 2024 with women making up 57 per cent of its 1.10 lakh borrowers and 35 per cent availing credit for the first time. The company has opened its 100th branch in Firozabad in Uttar Pradesh to provide small-ticket business loans to micro-enterprises. It has branches in eight States - Rajasthan, Punjab, Haryana, Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Bihar and Gujarat. The company aims to meet the growing and unmet credit needs of micro and small businesses in Uttar Pradesh and provides unsecured and secured business loans ranging from ₹70,000 to ₹10 lakhs to individual borrowers in Tier-III and below cities. Through various lending initiatives such as complementary veterinary services, agroforestry initiatives, and funding of biogas digesters, they aim to make a noticeable impact on the lives of borrowers and the environment.

India's soy meal exports were up 14 per cent during the first six months (October-March) of the oil year 2023-24 at 13.47 lakh tonnes over the same period last year's 11.79 lakh tonnes (lt) on strong demand from Asian countries. According to the supply and demand estimates by the Soybean Processors Association of India (SOPA), exports of soya meal for the oil year are expected to be around 18 lakh tonnes. Production of soya meal during the first six months stood at 53.16 lt - higher than the 52.25 lt registered in the same period last year. Offtake from the domestic feed sector was lower at 35 lt (35.75 lt).

Do you know that emotions play an important role in the lives of cows? Various studies and research have shown that the influence of the environment on the emotions of dairy cows is significant enough, and can be thoroughly interpreted through its behaviour. A fresh and verdurous environment with daily access to pastures significantly allows them to remain calm. The scientific reason behind this is that green is a cool colour. Other environmental factors such as housing conditions, space, water and temperature, can have an impact on the emotions of these cows. Overcrowded places, lack of ventilation, uncomfortable flooring and insufficiency of space causing reduced locomotion have all been shown to increase the emotional disturbance in dairy cows.

Editor



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Address:

1325-P, Second Floor,  
Sector-32, Urban Estate  
Near Hotel Noor Mahal  
KARNAL-132 001 (Haryana) INDIA

E-mail:

poultrytechno@gmail.com  
dinesh@srpublication.com

Website:

www.srpublication.com

Editor:

Dinesh Kumar Arora  
+91-98965 23333  
+91-86408 23333

Associate Editor:

Sudhir Aheriya  
+91-70150 26527

Circulation Incharge:

Vivek Soni  
+91-82950-11122

Editorial Board

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05

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PULSE OF LIVESTOCK INDUSTRY

## ARTICLE'S INDEX

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Content	Page No.
<b>Editorial</b>	4
<b>Article:</b> ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂਆਂ ਦੀ ਸਾਂਭ ਸੰਭਾਲ ਕਿਵੇਂ ਕਰੀਏ	08
<b>Article:</b> Aflatoxin: Prevalence and Control in Dairy Feeds and Milk	10
<b>Article:</b> डेयरी फार्मिंग में रिकॉर्ड रखने का महत्व	24
<b>Article:</b> Smart Mineral, Smart Nutrition, Smart Decision for Efficient growth	32
<b>Article:</b> Impact of global climate change on livestock Production and health	36
<b>NEWS:</b> Dr. Dinesh Bhosale decided to be Freelancer	35
<b>Press Release:</b> 2024 Alltech Agri-Food Outlook Shares Global Feed Production Survey Data and Influential Trends in Agriculture	16
<b>Press Release:</b> The 2024 Asia Agri-Tech Expo & Forum Demonstrates Taiwan's	28
<b>Press Release:</b> RVC 1977 3 <sup>rd</sup> Reunion at Shillong Meghalaya 23 <sup>rd</sup> Feb 2024	31
<b>Press Release:</b> Dairy Nutricon fostering collaboration & knowledge exchange	39
<b>Event Calendar</b>	38

## ADVERTISER'S INDEX

Company Name	Page No.	Company Name	Page No.
Adisseo Animal Nutrition Pvt. Ltd.	03	LDF India Expo - Hitex Hyd.	20
Alltech Biotechnology Pvt. Ltd.	17	Novus International Inc.	42
Anthem Biosciences Pvt. Ltd.	23	Nurture Organics Pvt. Ltd.	09
Avitech Nutrition Pvt. Ltd.	21	Orffa Animal Nutrition Pvt. Ltd.	11
Evonik Degussa India Pvt. Ltd.	25	Paras Nutrition Pvt. Ltd.	43
Fine Organic Industries Ltd.	02	Pari Animal Nutrition	19
Huvepharma Sea	Back Cover 44	Phileo Lesaffre Animal Care	Title Page 01
Informa Markets - Livestock Taiwan	29	Sapience Agribusiness Consultants	27
Jaysons Agritech Pvt. Ltd.	07	Sheetal Industries	05, 22
Kemin Industries	13	Trouw Nutrition Hifeed B.V.	33
Lallemand Animal Nutrition	15	Value Consultant	38



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ਡਾ. ਤੇਜਬੀਰ ਸਿੰਘ ਅਤੇ ਡਾ. ਜੁਝਾਰ ਸਿੰਘ ਸਿੱਧੂ

ਪਸ਼ੂ ਆਹਾਰ ਵਿਭਾਗ ਲੁਧਿਆਣਾ

ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂ ਪੱਠੇ ਅਤੇ ਖੁਰਾਕ ਘੱਟ ਖਾਂਦੇ ਹਨ, ਦੁੱਧ ਵੀ ਘੱਟ ਦਿੰਦੇ ਹਨ, ਹੋਰ ਵਿੱਚ ਵੀ ਨਹੀਂ ਆਉਂਦੇ। ਇਸ ਲਈ ਪਸ਼ੂਆਂ ਨੂੰ ਆਰਾਮਦਾਇਕ ਚਾਰਿਆਂ ਵਿੱਚ ਰੱਖਣਾ ਬਹੁਤ ਜ਼ਰੂਰੀ ਹੁੰਦਾ ਹੈ। ਹਾਲਾਂਕਿ ਦੇਸੀ ਗਾਵਾਂ ਗਰਮੀ ਨੂੰ ਸਹਾਰਨ ਦੀ ਸ਼ਕਤੀ ਰਖਦੀਆਂ ਹਨ, ਪਰ ਮੱਝਾਂ ਅਤੇ ਦੋਗਲੀਆਂ ਗਾਵਾਂ ਗਰਮੀ ਦਾ ਅਸਰ ਵਧੇਰੇ ਮਹਿਸੂਸ ਕਰਦੀਆਂ ਹਨ। ਜੇਕਰ ਪਸ਼ੂ ਜ਼ਿਆਦਾ ਦੇਰ ਤੱਕ ਗਰਮੀ ਵਾਲੇ ਵਾਤਾਵਰਣ ਵਿੱਚ ਰਹਿਣ ਤਾਂ ਉਹਨਾਂ ਦੀ ਦੁੱਧ ਉਤਪਾਦਨ ਦੀ ਸਮਰੱਥਾ ਤਾਂ ਘਟਦੀ ਹੀ ਹੈ ਨਾਲ ਬਿਮਾਰੀਆਂ ਨਾਲ ਲੜਨ ਦੀ ਸ਼ਕਤੀ ਵੀ ਘੱਟ ਜਾਂਦੀ ਹੈ। ਇਸ ਲਈ ਹੇਠ ਲਿਖੇ ਨੁਕਤੇ ਧਿਆਨ ਵਿੱਚ ਰੱਖੋ:

1. ਪਸ਼ੂਆਂ ਨੂੰ ਸਾਫ਼ ਸੁਥਰੇ ਖੁੱਲੇ ਹਵਾਦਾਰ ਸ਼ੈੱਡ ਵਿੱਚ ਰੱਖੋ।
2. ਤਾਜ਼ਾ ਪਾਣੀ ਹਰ ਵੇਲੇ ਮੁਹੱਈਆ ਕਰਵਾਓ।
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4. ਸ਼ੈੱਡਾਂ ਆਲੇ ਦੁਆਲੇ ਛਾਂ-ਦਾਰ ਰੁੱਖ ਲਗਾਓ ਤਾਂ ਜੋ ਗਰਮੀ ਵੇਲੇ ਪਸ਼ੂ ਛਾਵੇਂ ਬੈਠ ਸਕਣ।
5. ਸ਼ੈੱਡ ਦੀ ਲੰਬਾਈ ਚੜ੍ਹਦੇ ਲਹਿੰਦੇ ਭਾਵ ਪੂਰਬ-ਪੱਛਮ ਵਾਲੇ ਪਾਸੇ ਰੱਖੋ ਤਾਂ ਗਰਮੀਆਂ ਦੇ ਦਿਨਾਂ ਵਿੱਚ ਦੁਪਿਹਰ ਵੇਲੇ ਧੁੱਪ ਵੀ ਅੰਦਰ ਨਹੀਂ ਆਉਂਦੀ ਅਤੇ ਗਰਮ ਹਵਾਵਾਂ ਵੀ ਨਹੀਂ ਆਉਂਦੀਆਂ। ਸ਼ੈੱਡ ਵਿੱਚੋਂ ਗੋਹਾ ਆਦਿ ਚੁੱਕ ਕੇ ਸਫ਼ਾਈ ਰੱਖੋ।
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10. ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂਆਂ ਨੂੰ ਸਵੇਰੇ ਅਤੇ ਸ਼ਾਮ ਦੇ ਟਾਇਮ ਖੁਰਾਕ ਪਾਓ ਜਦੋਂ ਗਰਮੀ ਘੱਟ ਹੁੰਦੀ ਹੈ।

11. ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂ ਖਾਸ ਕਰਕੇ ਮੱਝਾਂ ਹੋਰ ਦੇ ਚਿੰਨ੍ਹ ਘੱਟ ਦਿਖਾਉਂਦੀਆਂ ਹਨ। ਇਸ ਲਈ ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂਆਂ ਨੂੰ ਹੋਰ ਲਈ ਸਵੇਰੇ ਸ਼ਾਮ ਧਿਆਨ ਨਾਲ ਦੇਖੋ। ਗਰਭਦਾਨ ਕਰਾਉਣ ਦੀ ਮਿਤੀ ਨੋਟ ਕਰਕੇ 18 ਤੋਂ 22 ਦਿਨ ਦੇ ਵਿਚਕਾਰ ਦੁਬਾਰਾ ਹੋਰ ਦੇ ਚਿੰਨ੍ਹਾਂ ਲਈ ਪਰਖੋ।

12. ਗਰਮੀਆਂ ਵਿੱਚ ਚਿੱਚੜਾਂ ਜੂਆਂ ਵਿੱਚ ਵਾਧਾ ਹੋ ਜਾਂਦਾ ਹੈ ਜੋ ਨਾ ਕੇਵਲ ਖੂਨ ਚੂਸਦੇ ਹਨ ਸਗੋਂ ਬਿਮਾਰੀਆਂ ਦੇ ਕੀਟਾਣੂ ਵੀ ਪਸ਼ੂ ਦੇ ਸਰੀਰ ਵਿੱਚ ਦਾਖਲ ਕਰ ਦਿੰਦੇ ਹਨ ਜਿਸ ਕਾਰਨ ਗਰਮੀਆਂ ਵਿੱਚ ਪਸ਼ੂ ਵਧੇਰੇ ਬਿਮਾਰ ਹੁੰਦੇ ਹਨ। ਇਸ ਲਈ ਕਿਸੇ ਸਿਫਾਰਸ਼ਸ਼ੁਦਾ ਕੀਟਨਾਸ਼ਕ ਦਾ ਸਪਰੇਅ ਮਹੀਨੇ ਵਿੱਚ ਦੋ ਵਾਰ ਜ਼ਰੂਰ ਕਰੋ ਅਤੇ ਨਾਲ ਹੀ ਡੋਅਰੀ ਫਾਰਮ ਧੋਣ ਵੇਲੇ ਫਿਨਾਇਲ ਦੀ ਵੀ ਵਰਤੋਂ ਕਰੋ ਜਿਸ ਨਾਲ ਬਿਮਾਰੀਆਂ ਤੋਂ ਕਾਫੀ ਬਚਿਆ ਜਾ ਸਕਦਾ ਹੈ।

13. ਤਾਪਮਾਨ ਤੇ ਨਮੀ ਦਾ ਪਸ਼ੂਆਂ ਤੇ ਬਹੁਤ ਅਸਰ ਪੈਂਦਾ ਹੈ ਤੇ ਇਸਨੂੰ ਟਾਈਮਪਏਰਏਟਰ ਹੁਮਿਦਿਟੀ ਨਦਬਣ (ਠੀ) ਕਹਿੰਦੇ ਹਨ। ਇਸਨੂੰ ਹੇਠਾਂ ਦਿੱਤੇ ਫਾਰਮੂਲੇ ਨਾਲ ਕੱਢਿਆ ਜਾਂਦਾ ਹੈ:

$$THI = 0.8 * T + RH * (T - 14.4) + 46.4$$

T = ਤਾਪਮਾਨ ਡਿਗਰੀ ਸੈਲਸੀਅਸ ਵਿੱਚ

RH = ਹੁਮਿਡਿਟੀ ਜਾਂ ਨਮੀ ਜੇਕਰ ਨਮੀ 75 % ਹੈ ਤਾਂ ਉਸਨੂੰ 0.75 ਲਿਖਦੇ ਹਨ

ਇਕ ਉਧਾਰਣ ਦੇ ਤੌਰ ਤੇ ਜੇ ਬਾਹਰ ਤਾਪਮਾਨ 32°C ਹੈ ਤੇ ਨਮੀ 22% ਹੈ ਤਾਂ THI ਹੇਠਾਂ ਦਿੱਤੇ ਤਰੀਕੇ ਨਾਲ ਕੱਢਿਆ ਜਾਂਦਾ ਹੈ:

$$THI = 0.8 * 32 + 0.22 * (32 - 14.4) + 46.4$$

$$THI = 75.9$$

ਦੋਗਲੀਆਂ ਗਾਵਾਂ 67 THI ਤੱਕ ਆਰਾਮ ਨਾਲ ਰਹਿ ਸਕਦੀਆਂ ਹਨ।

ਹੇਠਾਂ ਲਿਖੇ THI ਨੂੰ ਦੇਖ ਪਸ਼ੂਆਂ ਤੇ ਗਰਮੀ ਦਾ ਪ੍ਰਭਾਵ ਪਤਾ ਲਾਇਆ ਜਾ ਸਕਦਾ ਹੈ

ਘੱਟ ਗਰਮੀ ਦਾ ਪ੍ਰਭਾਵ 68-71 THI

ਠੀਕ - ਠੀਕ ਗਰਮੀ ਦਾ ਪ੍ਰਭਾਵ 72-79 THI

ਬਹੁਤ ਜ਼ਿਆਦਾ ਗਰਮੀ ਦਾ ਪ੍ਰਭਾਵ 80-89 THI

ਜੇਕਰ THI 80 ਤੋਂ ਜ਼ਿਆਦਾ ਹੈ ਤਾਂ ਪਸ਼ੂਆਂ ਵਿੱਚ 8-10 % ਡਰਾਈ ਮੈਟਰ ਇੰਟੇਕ ਜਾਂ ਖਾਣ ਦੀ ਸਮਰੱਥਾ ਘੱਟ ਜਾਂਦੀ ਹੈ ਅਤੇ ਜਿਸ ਕਾਰਣ ਪਸ਼ੂਆਂ ਦਾ ਦੁੱਧ ਉਤਪਾਦਨ 10-25 % ਤੱਕ ਘੱਟ ਜਾਂਦਾ ਹੈ ਜਿਸ ਕਾਰਣ ਪਸ਼ੂ ਪਾਲਣ ਧੰਦੇ ਵਿੱਚ ਕਾਫੀ ਨੁਕਸਾਨ ਹੁੰਦਾ ਹੈ।

ਸੋ ਕਿਸਾਨ ਵੀਰ ਉਪਰੋਕਤ ਗੱਲਾਂ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖ ਕੇ ਪਸ਼ੂਆਂ ਨੂੰ ਗਰਮੀਆਂ ਤੋਂ ਬਚਾਅ ਸਕਦੇ ਹਨ ਅਤੇ ਹੋਣ ਵਾਲੇ ਘਾਟੇ ਤੋਂ ਬੱਚ ਸਕਦੇ ਹਨ।



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# Aflatoxin

## PART-I PREVALENCE

# Prevalence and Control in Dairy Feeds and Milk

G. Devegowda , V. Sridhar and P. L. Sherasia

### 1.0 Executive summary

Aflatoxins are the most widespread and the most studied group of all the mycotoxins, and they are prevalent in warm and humid climatic conditions; as exists in India and in many Asian countries. Aflatoxins are primarily produced by fungi of the genus *Aspergillus* (*Aspergillus flavus*, *Aspergillus parasiticus*, and *Aspergillus nomius*), and are found in dairy feeds and human food products. Major forms of Aflatoxins found in feeds include Aflatoxins B1, B2, G1 and G2; with Aflatoxin B1 being the most common and toxic. Aflatoxin M1 is found in milk and milk products.

Strict control of Aflatoxin B1 level in feeds for lactating dairy cattle and buffaloes is required in order to minimize the level of Aflatoxin M1 in milk and milk products. The United States Food and Drug Administration (USFDA, 2018) and Food Safety and Standards Authority of India (FSSAI, FSS Regulation 2011) set a maximum permissible level for Aflatoxin M1 in milk at 0.5 µg/kg (ppb; parts per billion) of milk, which means that one ton of milk should not contain more than 500 micrograms of Aflatoxin M1.

Aflatoxin B1 is readily transmitted from feed to milk; approximately 1.0 to 6.0% of Aflatoxin B1 present in feed is transferred to milk as Aflatoxin M1, depending on factors such as the genetics of animals, seasonal variation, the milking process and the environmental conditions. The occurrence of Aflatoxins in commercially available milk, and milk products is of concern, as milk is a key source of nutrients for humans.

### 2.0 Introduction

There are more than 10,000 known species of fungi. Fortunately, most of them are beneficial to man in the production of bread, cheese, antibiotics etc. There are about 50 fungi species harmful to livestock, poultry, and man known to produce toxins, which are collectively called mycotoxins. Mycotoxins are metabolites

produced by fungi during metabolism of nutrients present in feeds and feed ingredients.

Fungi produce mycotoxins in the field ("field toxins": fusarium toxins) or in storage ("storage toxins": Aflatoxins, ochratoxins), or both. Mycotoxins are mainly produced by the fungi genera of *Aspergillus*, *Fusarium*, *Penicillia*, and *Claviceps*. Their formation may occur when the fungi grow on crops in the field, at harvest, in storage or during the processing of feed when conditions are favorable.

No region of the world escapes these silent killers, and their negative impact on animal productivity and human health is enormous. According to the United Nations Food and Agriculture Organization (FAO), approximately 25% of World's grain supply is contaminated with mycotoxins. Recently, a 38 member scientific task-force from the Council for Agricultural Science and Technology (CAST, 2003) in the USA released a 200 page report entitled "Mycotoxins: Risks in Plant, Animal, and Human systems". According to the report, in the United States alone the economic costs resulting from mycotoxins exceed \$1.5 billion annually.

### 3.0 Mycotoxins: An overview

#### 3.1 Geographical distribution of mycotoxins

The threat of mycotoxins has been described as early as the Second World War when the soldiers from the Russian army suffered severe dermal necrosis, hemorrhages and destruction of bone marrow after eating mouldy grains (*Fusarium* contaminated, Figure 1). However, it was not until 1960, when the entire turkey population of Britain was decimated in a fatal liver disease called 'Turkey X Disease', that the scientific community recognized the negative effects associated with mycotoxins. British agriculture officials later traced the source of the outbreak to Aflatoxin in a shipment of peanut (groundnut) meal that originated from Brazil.



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**MORE INFORMATION**

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Figure 1: Maize cobs contaminated with *Fusarium* fungus

The occurrence of mycotoxins in nature is considered a global problem. However, in certain geographical areas of the world, some mycotoxins are produced more readily than others. In colder, more temperate regions such as Canada, the Northern US and most of the European countries, Aflatoxins are not considered to be a major problem except in imported feedstuffs grown in warmer southern climates. Economically, in these regions the most important mycotoxins are deoxynivalenol (DON, Vomitoxin), Zearalenone (ZEA), T-2 toxin produced by *Fusarium* fungi (Figure 1).

In Europe, the differences in climatic conditions among the northern, middle and southern parts favor the development of different fungal species. In the maize growing areas of southern and middle Europe (Sweden, Austria and Hungary) mainly fusariotoxins (DON, ZEA, T-2 toxin) cause illness and poor performance of dairy animals.

### 3.1.1 Deoxynivalenol (DON, Vomitoxin)

Deoxynivalenol is produced by several *Fusarium* species of mould primarily *Fusarium graminearum* and may co-occur with other mycotoxins in contaminated commodities. DON in cattle and buffaloes has been associated with reduced feed intake and lower milk production when fed with feed containing more than 5 parts per million (ppm).

### 3.1.2 Zearalenone

Zearalenone is produced primarily by *Fusarium graminearum* and *Fusarium roseum*. Zearalenone is responsible for reproductive disorders because of its estrogenic effect. In dairy animals, the clinical manifestations such as udder enlargement, decreased milk yield, vaginal discharge, continuous estrus, infertility and abortions are observed when the level of zearalenone in the feed is more than 0.5 ppm.

### 3.1.3 Fumonisin

Fumonisin are primarily produced by *Fusarium moniliforme* and *Fusarium proliferatum*, the most toxic being fumonisin B1. Fumonisin mycotoxins are found in a wide range of commodities from millets to grains to banana fruits. They are a major concern to food and feed producers since they affect human and animal health. The toxin causes liver damage and decreased milk production in dairy cattle at levels greater than 50 ppm in the ration. Usually, level of fumonisins exist between 5-20 ppm in feed.

## 4.0 Global scenario of Aflatoxins

Aflatoxins; the most widespread of all the mycotoxins, are common in warm and humid climatic conditions like those

existing in India, Latin American, Asian and African countries, southern regions of US, and certain parts of Australia. Extensive surveys conducted in India, Pakistan, Egypt and South Africa suggested that Aflatoxins are often encountered in substantial levels in feeds and feed ingredients (Figure 2).

In Latin American countries including Brazil, Peru, Mexico, Columbia, Venezuela and Argentina, reports exist on the presence of Aflatoxins. Due to the increase in global trading of feedstuffs, mycotoxins are no longer solely found in certain geographical regions but are now more widely distributed than before (Devegowda et al., 1998).

Aflatoxins B1, B2, G1, and G2 refer to toxins which fluoresce blue (B1, B2) or green (G1, G2) under ultraviolet light. Among all Aflatoxins, B1 is the more prevalent and toxic.



Figure 2: Maize naturally contaminated with *Aspergillus* fungus

## 5.0 Limits of Aflatoxins in feed and milk in other countries

Strictly speaking, there is no safe level. With reference to mycotoxins, the risk directly depends on the level of the major mycotoxins and also on the presence and levels of other mycotoxins in feeds. A mycotoxin level considered safe in one farm may not be safe in another farm because of differences in management and disease prevalence. Additionally, factors such as interaction of mycotoxins with pathogens, genetic variability, environmental conditions, and nutritional status etc. influence the severity of the manifestation of mycotoxicosis.

In order to reduce the toxic and economic impact of mycotoxins, several countries regulate the levels of some mycotoxins in foods and feeds. Worldwide, food and feed legislation safeguards the health of consumers and the economic interests of animal producers and traders. Virtually, all countries with fully developed market economies have regulations with the exception of some African countries.

Table 1: Limits for Aflatoxin B1 in dairy feed

Country	Aflatoxin B1 (g/kg or ppb)
United States (FDA)	20
European Union (for milking animals)	5
European Union (for calves)	10
India (BIS)	20



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**Table 2: Limits for other mycotoxins in dairy feed**

Mycotoxins (EU Guidelines)	Limits (mg/kg or ppm)
Deoxynivalenol: Adult animals	5
: Calves	2
Zearalenone: Adults and calves	0.5
Fumonisin B1 and B2: Adult animals	50
: Calves	20

**Table 3: Limits for Aflatoxin M1 in milk**

Country	(g/kg or ppb)
United States (USFDA)	0.5
European Union	0.05
European Union, for baby foods/ infants	0.025
Australia (FSANZ)	0.05
Australia, for infants	0.02
India (FSSAI)	0.5

**6.0 Overview of Aflatoxins in feed and feed raw materials in India**

Aflatoxins are primarily produced by fungi of the genus *Aspergillus* (*Aspergillus flavus*, *Aspergillus parasiticus*, and *Aspergillus nomius*;



*Aspergillus nomius*; Figure 3) and are found in dairy feed and human food products. Major forms of Aflatoxins found in feeds include Aflatoxins B1, B2, G1 and G2; with Aflatoxin B1 being the most common and toxic.

Figure 3: Growth of *Aspergillus flavus* on rice

Extensive surveys conducted in India suggest that Aflatoxins are often encountered in substantial levels in feeds and feed ingredients. Aflatoxins are rarely found in forages. To study the incidence of Aflatoxin B1 in different raw materials, a survey was conducted by the Division of Animal Sciences, University of Agricultural Sciences, Bengaluru. The results of the survey showed that out of 246 samples analyzed by Thin Layer Chromatography (TLC), 206 samples were found to be positive for the presence of either Aflatoxin.

The cereal and cereal byproducts analyzed were maize, deoiled rice bran, rice polish and wheat bran. The samples were found 88% positive for Aflatoxins. The oilseed meals analyzed were soybean meal, full-fat soy, sunflower meal, groundnut cake/ extract/ expeller, rapeseed meal and til cake. The oilseed meals contain higher incidence of Aflatoxin (96%) contamination as compared to cereals and cereal byproducts.

Aflatoxin B1 content was analysed in some samples of cattle feed (n=254) suspected to be contaminated with Aflatoxins at NDDB, Anand (NDDB, 2018). The results found that the average level of Aflatoxin B1 was 68 ppb in these samples.

**7.0 Metabolism of Aflatoxin in ruminants and conversion of Aflatoxin B1 to Aflatoxin M1**

In milk, Aflatoxin appears as Aflatoxin M1, one of its metabolites. Aflatoxin B1 is metabolized by enzymes found primarily in the liver (Cytochrome P450) to Aflatoxin M1. Strict control of Aflatoxin B1 level in feeds for dairy animals is required in order to minimize the level of Aflatoxin M1 in milk and milk products.

In the US (FDA) and in India (FSSAI), it is required by the law that Aflatoxin M1 in milk should be less than 0.5 ppb; which means that one ton of milk should not contain more than 500 micrograms of Aflatoxin M1. In European Union, the regulations are much more stringent, and maximum levels are set at 0.05 ppb (EC, 2002). Aflatoxin is readily transmitted from feed to milk; approximately 1.0 to 6.0% of Aflatoxin B1 present in feed is transferred to milk as Aflatoxin M1 (Figure 4). After Aflatoxin M1 is formed, it is excreted in milk and urine of the dairy animals.

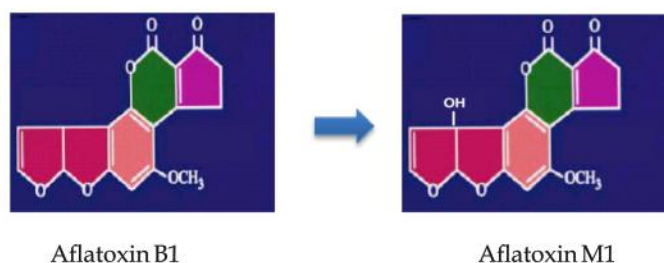


Figure 4: Conversion of Aflatoxin B1 to M1

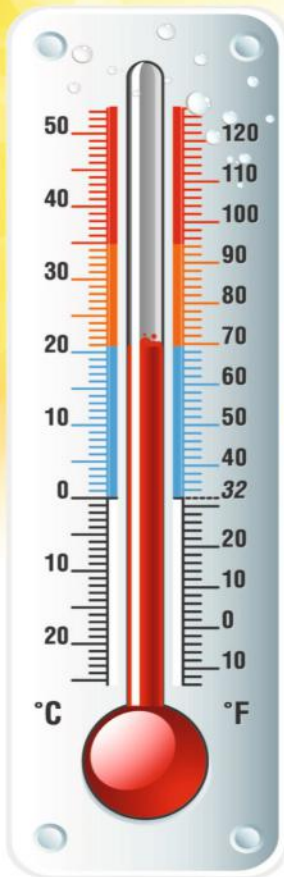
Diaz et al. (2004) have indicated that Aflatoxins appear in milk within 12 hours following oral administration of Aflatoxin B1. The peak concentration in milk occurs after 24 hrs. Clearance is also very rapid, since Aflatoxin disappears from the milk four days after cessation of oral administration (Diaz et al., 2004). These results confirm the rapid absorption and metabolism of Aflatoxins in ruminants.

The USFDA and BIS (India) stipulate a maximum level of 20 ppb of Aflatoxin in dairy feed, which means that one ton of feed should not contain more than 20 milligrams of Aflatoxin B1. The European Union regulations are much more stringent and the maximum level set at 5.0 ppb. Like Aflatoxin B1, Aflatoxin M1 is toxic, although toxicity of Aflatoxin M1 is somewhat lower than that of Aflatoxin B1.

**8.0 Impact of feeding Aflatoxin contaminated feed in dairy animals**

Milk producers may not be able to see visual symptoms of aflatoxicosis in the animals at low level Aflatoxin in the feed. However, high concentrations of Aflatoxins and/ or prolonged duration may cause visual symptoms in dairy animals. Feed refusal, reduced growth rate and decreased feed conversion efficiency are the predominant signs of chronic Aflatoxin poisoning. In addition, listlessness, weight loss, rough hair coat and mild diarrhea may occur. The disease may also impair reproductive efficiency, including abnormal estrous cycles (too short and too long) and abortions. Other symptoms include impaired immune system response, and increased susceptibility to diseases.

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1 Saint Pierre et al., 2003 - 2 Burgos & Collier, 2011.

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\*Marfola, et al, ADSA 2010.

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# 2024 Alltech Agri-Food Outlook

Shares Global Feed Production Survey Data and Influential Trends in Agriculture

*Data collected from 13th annual global feed survey estimates world feed production remains steady, with a slight decrease of 0.2% to 1.29 billion metric tons. Lower demand attributed in part to more efficient use of feed; poultry feed shows most significant growth. The 2024 Alltech Agri-Food Outlook revealed global feed production survey data and trends.*

**G**lobal animal feed production remained steady in 2023 at 1.29 billion metric tons (BMT), a slight decrease of 2.6 million metric tons (MMT) – or 0.2% – from 2022's estimates, according to the 2024 Agri-Food Outlook, released today by Alltech. The annual survey, now in its 13th year, includes data from 142 countries and more than 27,000 feed mills.

The overall lower demand for feed was due, in part, to the more efficient use of feed made possible by intensive production systems that focus on using animal nutrition, farm management and other technologies to lower feed intake while producing the same amount of protein, or more. A slowdown in the overall production of animal protein, in response to tight margins experienced by many feed and animal protein companies, also contributed to lower feed demand. Changing consumption patterns caused by inflation and dietary trends, higher production costs and geopolitical tensions also influenced feed production in 2023.

#### Top 10 countries:

The top 10 feed-producing countries are China (262.71 MMT, +0.76%), the U.S. (238.09 MMT, -1.13%), Brazil (83.32 MMT, +1.84%), India (52.83 MMT, +13.43%), Mexico (40.42 MMT, +0.02%), Russia (35.46 MMT, +3.83%), Spain (27.53 MMT, -11.88%), Vietnam (24.15 MMT, -9.63%), Japan (23.94 MMT, -1.15%) and Türkiye (23.37 MMT, -11.48%). Together, the top 10 countries produced 63.1% of the world's feed production (same as in 2022), and almost half of the world's global feed production is concentrated in four countries: China, the U.S., Brazil and India.

#### Notable species results and outlook:

- **Poultry** experienced an increase in broiler feed production (385.04 MMT, +13.10 MMT, +3.5%) and remained steady with a slight increase for layers (170.88 MMT, +0.01 MMT, 0%).

- **Broiler** feed now accounts for 29.9% of the total feed tonnage in the world thanks to a 3.5% increase in overall tonnage in 2023. While this growth was not uniform across all regions, the poultry sector is poised to keep holding strong in 2024 thanks to a combination of regional successes and global market dynamics. Some of the biggest factors that will contribute to the resilience of the broiler sector include reduced costs for inputs, such as feed and energy, and increases in margins and profitability.
- For **layers**, there are industry-wide efforts to optimize feed efficiency and to keep pace with changing dietary trends and new purchasing power. Some markets around the globe were significantly impacted by macroeconomic challenges and disease outbreaks, which can disrupt production cycles. Still, the general outlook for the layer industry remains positive thanks to its resilience in the face of difficult circumstances, when other protein sectors often struggle to adapt.
- The poultry sector is poised for continued strength, driven by a blend of regional successes and global market dynamics. The broiler forecast remains optimistic thanks to lower input costs, increased industrial margins and shifting consumer behaviors. For layers, challenges persist, but there are pockets of resilience and growth.
- The global **pig** feed production sector faced many challenges in 2023, which led to an overall decrease in pig feed production of 1.23% (320.80 MMT, -4.01 MMT).
- Latin America stood out as the only region that achieved an increase in pig feed production in 2023, while Europe, Asia-Pacific and North America – which have traditionally been the top pig feed-producing regions in the world – all faced challenges. African swine fever (ASF) continues to wreak havoc on pig production in China and Southeast Asia, where repopulation efforts are slowly proceeding.



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- The trends highlight the complex relationship between economic factors, supply dynamics and disease management in the global pig feed industry. Addressing these challenges will be crucial for sustaining animal agriculture and ensuring food security.
  - **Dairy** feed tonnage decreased by 2.3% (126.23 MMT, -2.28%), primarily due to the high cost of feed combined with low milk prices, which led farmers to make strategic adjustments that included reducing their cow numbers and/or relying more on non-commercial feed sources.
    - In Europe, dairy producers will continue to grapple with stricter environmental policies in the years ahead, and they will need to find new ways to continue growing.
    - Asia-Pacific managed to buck the downward trend and emerged as the only region that increased its dairy feed tonnage in 2023. This growth was fueled by a continued increase in the consumption of milk products there, as well as an expansion of feed production in co-operatives.
    - This shift reflects the delicate balance between economic factors and the need to sustain dairy production. Lower feed costs and higher milk prices would help right the ship.
  - **Beef** feed production decreased by 4.36% (117.49 MMT, -5.35 MMT) globally – the most pronounced downward change among all species sectors last year. Changes in cattle cycles in the United States and stricter sustainability policies in Europe had major impacts, with the Asia-Pacific beef sector notably surpassing Europe's in 2023.
    - The substantial decline in North America was the result of lingering droughts and high production costs, among other issues.
    - While the European and North American beef industries are expected to continue declining in 2024, growth is expected in China, Brazil and Australia – highlighting the complex dynamics and landscape of beef feed production around the world.
  - The **aquaculture** sector experienced a decline of 4.4% (52.09 MMT, -2.42 MMT).
    - This decline was driven in part by a significant drop in China's supply of aqua feed due to lower fish prices, which had a far-reaching impact.
    - Latin America grew by 0.27 MMT (3.87%). Despite adverse weather conditions in that region, the demand for aqua products is still strong in Latin America, which helped aqua producers there remain resilient.
  - The global **pet** feed industry continues to grow, albeit at a slower pace of 0.74% (34.96 MMT, +0.26 MMT) in 2023. Demand for high-quality pet products and services remains high from pet owners who want only the best for their animal companions.
    - The Latin American and North American markets were the primary drivers of this growth, with the pet food sector in North America surpassing Europe's this year.
    - Europe was the only market experiencing a decline in pet food production in 2023. Supply-chain disruptions and inflationary pressures were the key factors contributing to this decrease.
  - The **equine** feed industry experienced a decrease of 3.9% (7.98 MMT, -0.32 MMT) in 2023.
    - The top challenges in the equine sector include high labor and material prices.
    - The top technologies impacting the sector are biosecurity, microchipping, genetics and nutritional solutions.
    - Survey respondents said the biggest opportunities for nutritional solutions are gut health management and feed efficiency.
    - Equine feed is expected to decrease both in price and in volume during the coming year.
- Notable regional results:**
- North America saw a decrease of 2.8 MMT (259.26 MMT, -1.1%), with beef feed tonnage down significantly. The pig and dairy sectors also slipped slightly, but the broiler, layer and pet sectors more than made up the difference. Feed tonnage in the broiler sector was up nearly 2.9%.
  - Latin America experienced growth in 2023 by 2.46 MMT (200.67 MMT, +1.24%). Despite high production costs, geopolitical tensions and changing consumer behavior due to economic reasons, the region continues to lead global growth, mainly because of its export-driven aquaculture, poultry and pork markets.
  - Europe continued its downward trend in feed production, with a decrease of 10.07 MMT (253.19 MMT, -3.82%) due to issues that included the invasion in Ukraine and the spread of animal diseases such as African swine fever (ASF) and avian influenza (AI).
  - Asia-Pacific led feed production growth in 2023, with an increase of 6.54 MMT (475.33 MMT, +1.4%). Feed production growth in the region's ruminant sectors offset a setback in the aqua sector. The region is home to several of the top 10 feed-producing countries, including China, India, Vietnam and Japan.
  - Africa experienced continued but slower growth with an increase of 1.95%, nearly 1 MMT to total 51.42 MMT.
  - The Middle East saw a slight decrease of 0.12 MMT (35.93 MMT, -0.32%).
  - Oceania had the third-highest growth, 3.71% or 0.39 MMT to total 10.78 MMT.
- Alltech works together with feed mills and industry and government entities around the world to compile data and insights to provide an assessment of feed production each year. Compound feed production and prices were collected by Alltech's global sales team and in partnership with local feed associations in the first quarter of 2024. These figures are estimates and are intended to serve as an information resource for industry stakeholders.
- To access more data and insights from the 2024 Alltech Agri-Food Outlook, including an interactive global map, visit: [alltech.com/agri-food-outlook](http://alltech.com/agri-food-outlook).

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# डेयरी फार्मिंग में रिकॉर्ड रखने का महत्व

निलय देशपांडे<sup>1</sup>, गीता पिपलिया<sup>2</sup>, आदित्य देशपांडे<sup>3</sup>

<sup>1,3</sup>भाकृअप. भारतीय पशु चिकित्सा अनुसंधान संस्थान बरेली उत्तर प्रदेश

<sup>2</sup>भाकृअप-महात्मा गांधी समेकित कृषि अनुसंधान संस्थान, पिपराकोठी, मोतिहारी

डेयरी फार्मिंग एक जटिल और गतिशील व्यवसाय है जिसमें बड़ी संख्या में दुधारू-पशुओं का प्रबंधन शामिल है, जिनकी विशेषताएं एवं आवश्यकताएं दोनों अलग-अलग हैं। डेयरी किसानों के लिए यह बहुत आवश्यक है, कि वे पशु-प्रदर्शन के विभिन्न पहलुओं, जैसे विकास, प्रजनन, स्वास्थ्य और दूध उत्पादन की लगातार निगरानी और मूल्यांकन की ओर ध्यान दें। ये पहलू कई कारकों से प्रभावित होते हैं, जैसे आनुवंशिकी, पोषण, पर्यावरण, प्रबंधन, आदि। डेयरी किसानों के लिए अपने पशुधन व्यवसाय से संबंधित आंकड़ों को एकत्र करने, संग्रहित करने और विश्लेषण करने के लिए रिकॉर्ड रखना एक मुख्य आवश्यकता है। डेयरी किसान अपने पशुओं की प्रमुख गतिविधियों और उच्च-उपयोगिता वाले आंकड़ों जैसे कि जन्म तिथि, पहचान संख्या, ब्याने और दुग्धकाल की अवधि, दूध-उत्पादन और गुणवत्ता, प्रजनन और गर्भाधान विवरण, गर्भावस्था और प्रजनन स्थिति, स्वास्थ्य और रोग का इतिहास, चारा और पानी की खपत, शारीरिक भार और स्थिति, मृत्यु और उसका कारण, आय और व्यय आदि आंकड़ों को रिकॉर्ड कर अपने पशुओं के प्रदर्शन और प्रगति की जांच कर सकते हैं ताकि उपज रही समस्याओं की पहचान और समाधान को निश्चित किया जा सके, और कानूनी और गुणवत्ता मानकों का अनुपालन, क्रेडिट, बीमा और विस्तार सेवाओं तक पहुंच का अनुमान लगा कर, वे अपने पशुधन व्यवसाय को बेहतर बनाने के लिए रणनीतियों की योजना बना कर उन्हें लागू कर सकते हैं, जिससे डेयरी फार्मिंग में आने वाली लागत और आय आदि को नियंत्रित किया जा सके। रिकॉर्ड रखने से डेयरी किसानों को उनकी उत्पादकता, लाभप्रदता और उनके डेयरी फार्मिंग व्यवसाय की स्थिरता लाने में मदद मिल सकती है। इस लेख में, हम डेयरी फार्मिंग में रिकॉर्ड रखने के प्रकार, लाभ और तरीकों पर चर्चा करेंगे।

## रिकॉर्ड रखने का महत्व—

- कम उत्पादकता, उच्च मृत्यु दर, बीमारी का प्रकोप आदि जैसी समस्याओं की पहचान कर उनका समाधान किया जा सकता है।
- अपने पशुधन व्यवसाय को बेहतर बनाने के लिए रणनीतियों की योजना बनाकर उन्हें लागू किया जा सकता है, जैसे जानवरों की छटनी करना, प्रजनन और चारा सम्बन्धी योजना तैयार करना आदि।
- अपने पशुधन व्यवसाय, जैसे चारा, श्रम, पशु चिकित्सा, दूध, आदि की लागत और आय का अनुमान लगाकर उसे नियंत्रित किया जा सकता है।
- पशु कल्याण, पहचान, स्वच्छता आदि जैसे कानूनी और गुणवत्ता मानकों का अनुपालन करने में सुविधा होती है।
- क्रेडिट, बीमा और विस्तार सेवाओं, जैसे ऋण, सब्सिडी, प्रशिक्षण आदि तक पहुंचने में सुविधा रहती है।

## डेयरी फार्मिंग में रखे जाने वाले रिकॉर्ड के प्रकार

इसमें दो प्रकार के रिकॉर्ड शामिल हैं

**1) तकनीकी रिकॉर्ड—** जानवरों के प्रदर्शन से संबंधित, जैसे .फार्म डेयरी, प्रजनन रिकॉर्ड, दाने का रिकॉर्ड, श्रम रिकॉर्ड, वंशावली और पशुओं का रिकॉर्ड, स्वास्थ्य रिकॉर्ड, उत्पादन रिकॉर्ड आदि

**2) बिजनेस रिकॉर्ड—** जैसे खरीद, निपटान, मृत स्टॉक का हिसाब—किताब, खाता बही, रोकड़ बही, क्रय बही, देय बिल बही, स्टोर स्टॉक बही, इन्वेंटरी रजिस्टर, उपस्थिति और भुगतान रिकॉर्ड आदि।

### 1. दुग्ध-उत्पादन रिकॉर्ड

प्रभावी डेयरी फार्मिंग प्रबंधन के लिए दुग्ध-उत्पादन रिकॉर्ड महत्वपूर्ण हैं। यह आंकड़ा फार्म के उत्पादक पशुओं के बारे में उचित निर्णय लेने में मदद करते हैं। उदाहरण—दुग्ध रिकॉर्ड रजिस्टर, दुग्ध सारांश रिकॉर्ड आदि। इन रिकॉर्डों का उपयोग अधिकतम पैदावार, निरंतरता, दुग्ध-दिवस, शुष्क दिन और औसत दैनिक दुग्ध-उत्पादन निर्धारित करने के लिए किया जा सकता है। किसान पशुओं के उत्पादक प्रदर्शन का मूल्यांकन करने के लिए इन दुग्ध-उत्पादन (लेक्टेशन) रिकॉर्ड का उपयोग कर सकते हैं। ये रिकॉर्ड जानवरों के चयन में मदद करते हैं।

**शुष्क अवधि—** अगले ब्यांत तक सूखने की तिथि (औसतन 60 दिन है)।

**दुग्ध अवधि—** ब्याने की तारीख से सूखने की तारीख तक (औसतन 305 दिन है)।

प्रभावी डेयरी फार्मिंग प्रबंधन के लिए दुग्ध-उत्पादन (लेक्टेशन) रिकॉर्ड वास्तव में महत्वपूर्ण हैं। वे पशुओं के उत्पादन संबंधी बहुमूल्य आंकड़े प्रदान करते हैं। यहां कुछ प्रकार के दुग्ध-उत्पादन (लेक्टेशन) रिकॉर्ड और उनके उपयोग दिए गए हैं—

**1. दुग्ध रिकॉर्ड रजिस्टर—** यह रजिस्टर प्रत्येक गाय की दैनिक दुग्ध-उत्पादन क्षमता का ट्रैक रखता है। यह दुग्ध उत्पादन में परिवर्तनों की पहचान करने में मदद करता है, जो स्वास्थ्य समस्याओं या फीड में परिवर्तन जैसे विभिन्न कारकों के कारण हो सकता है।

**2. दूध सारांश रिकॉर्ड—** यह रिकॉर्ड एक निश्चित अवधि में पशुओं के दुग्ध उत्पादन का सारांश प्रदान करता है। इसका उपयोग पशुओं के समग्र प्रदर्शन का मूल्यांकन करने के लिए किया जा सकता है।

इन अभिलेखों का उपयोग निम्नलिखित तरीकों से किया जा सकता है—

- **अधिकतम पैदावार का निर्धारण—** किसान प्रत्येक गाय की अधिकतम उत्पादन क्षमता निर्धारित कर सकते हैं। इस जानकारी का उपयोग उच्च प्रदर्शन करने वाली गायों की पहचान करने और दाना और प्रजनन रणनीतियों का प्रबंधन करने के लिए किया जा सकता है।
- **उत्पादकता प्रदर्शन का मूल्यांकन—** इस रिकॉर्ड का उपयोग दुधारू पशुओं के उत्पादकता प्रदर्शन का मूल्यांकन करने के लिए किया जा सकता है। इससे प्रजनन और कलिंग हेतु निर्णय लेने में मदद मिल सकती है।
- **जानवरों का चयन और कलिंग—** यह रिकॉर्ड प्रजनन के लिए दुधारू पशुओं के चयन और खराब प्रदर्शन करने वाले पशुओं की छटनी करने में मदद कर सकते हैं। इससे फार्म की समग्र उत्पादकता और लाभप्रदता में सुधार हो सकता है।



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- **शुष्क अवधि और दुग्ध-उत्पादन अवधि का प्रबंधन**— शुष्क अवधि (सूखा होने से लेकर अगले ब्याने तक की तारीख) और दुग्ध-उत्पादन अवधि (ब्याने की तारीख से लेकर ब्यांत होने की तारीख तक) एक डेयरी गाय के उत्पादन चक्र में महत्वपूर्ण चरण हैं। दुग्ध-उत्पादन रिकॉर्ड दूध उत्पादन को अनुकूलित करने के लिए इन अवधियों को प्रबंधित करने में मदद कर सकता है।

डेयरी फार्मिंग में दुग्ध-उत्पादन रिकॉर्ड के महत्व को कम नहीं कहा जा सकता है। वे फार्म के पशुओं के प्रदर्शन की निगरानी करने, उचित प्रबंधन निर्णय लेने और अंततः फार्म की लाभप्रदता में सुधार करने के लिए आवश्यक हैं।

## 2 फीडिंग रिकॉर्ड —

1. **बछड़ा आहार रजिस्टर**— यह रजिस्टर बछड़ों को दिए जाने वाले आहार का हिसाब रखता है। यह उनके विकास और स्वास्थ्य की निगरानी में मदद करता है।
2. **पशु चारा प्राप्ति रजिस्टर**— यह रजिस्टर प्राप्त फीड की मात्रा और प्रकार को रिकॉर्ड करता है। यह इन्वेंट्री प्रबंधन और भविष्य की फीड खरीद की योजना बनाने में मदद करता है।
3. **चारा खपत रजिस्टर**— यह रजिस्टर पशुओं द्वारा उपभोग किए गए चारे की मात्रा को रिकॉर्ड करता है। यह फीड दक्षता की निगरानी करने और आहार व्यवहार में किसी भी बदलाव की पहचान करने में मदद करता है।
4. **चारा ऑर्डर रजिस्टर**— यह रजिस्टर दिए गए फीड ऑर्डर का ट्रैक रखता है। यह फीड की आपूर्ति को प्रबंधित करने और यह सुनिश्चित करने में मदद करता है कि कोई कमी नहीं है।
5. **सांद्र (कंसन्ट्रेट) आहार अनुसूची**— यह अनुसूची पशुओं को दिए जाने वाले सांद्र आहार की मात्रा और प्रकार की रूपरेखा बताती है। यह पशुओं के लिए संतुलित पोषण सुनिश्चित करने में मदद करता है।

इन अभिलेखों का उपयोग फार्म की विशिष्ट आवश्यकताओं के आधार पर भिन्न हो सकता है। हालाँकि, वे आम तौर पर निम्नलिखित उद्देश्यों की पूर्ति करते हैं—

**स्वास्थ्य और उत्पादकता की निगरानी**— फीडिंग रिकॉर्ड से फीडिंग व्यवहार में बदलावों की पहचान करने में मदद मिल सकती है जो स्वास्थ्य समस्याओं का संकेत दे सकते हैं। इनका उपयोग फार्म के पशुओं की उत्पादकता की निगरानी के लिए भी किया जा सकता है।

**वित्तीय प्रबंधन**— फीडिंग रिकॉर्ड से फीड की लागत पर नजर रखने में मदद मिल सकती है, जो डेयरी फार्मिंग में एक बड़ा खर्च है। यह वित्तीय नियोजन और लाभप्रदता विश्लेषण में सहायता कर सकता है।

**पोषण प्रबंधन**— पशु क्या और कितना खा रहा है, इस पर नजर रखकर, किसान यह सुनिश्चित कर सकते हैं कि पशुओं को संतुलित आहार मिल रहा है। इससे दूध उत्पादन में सुधार हो सकता है।

**इन्वेंट्री प्रबंधन**— फीडिंग रिकॉर्ड फीड की इन्वेंट्री को प्रबंधित करने और भविष्य की खरीदारी की योजना बनाने में मदद कर सकते हैं।

डेयरी फार्मिंग ऑपरेशन में पशुओं के स्वास्थ्य, और उनसे उत्पादन और लाभ प्राप्त करने के लिए विस्तृत फीडिंग रिकॉर्ड बनाए रखना आवश्यक है। आहार सेवन और लागत की व्यवस्थित रिकॉर्डिंग

उचित निर्णय लेने में सक्षम बनाती है और यह सुनिश्चित करती है कि प्रत्येक गाय को उच्च गुणवत्ता युक्त दूध उत्पादन के लिए आवश्यक पोषण प्राप्त हो।

## 3 प्रजनन एवं ब्यांत रजिस्टर—

### महत्त्व —

प्रति गर्भ धारण हेतु किये जाने वाली सर्विस का निर्धारण करने हेतु उपयोगी होता है।

प्राकृतिक एवं कृत्रिम गर्भाधान की तुलना करने हेतु उपयोगी है।

गाय की प्रजनन क्षमता निर्धारित करने में मदद करता है।

यह खराब प्रजनन क्षमता वाले जानवरों की छटनी करने में सहायता करता है।

प्रजनन दक्षता =  $12X(n-1)/D$

n – ब्यात की संख्या, D – प्रथम ब्यांत से अंतिम ब्यांत तक के दिनों की संख्या।

सर्विस अवधि— बछड़े के जन्म की तिथि से सफल सर्विस की तिथि तक (औसतन 90 दिन है।)

गर्भाधान अवधि — सफल सेवा की तिथि से ब्याने की तिथि तक (गायमें 285 दिन, भैंस में 310 दिन।)

ब्याने का अंतराल — दो सफल ब्यांतों के बीच की अवधि (गाय के लिए अधिकतम 12–13 महीने, भैंस के लिए 13–14 महीने।)

### दुग्ध उत्पादन की निरंतरता—

वर्तमान माह का दुग्ध उत्पादन / पिछले माह का दुग्ध उत्पादन X 100  
डेयरी फार्मिंग प्रबंधन में प्रजनन और ब्यांत रजिस्टर रखना अत्यंत आवश्यक हैं।

1. **प्रजनन और ब्यांत रजिस्टर**— यह रजिस्टर पशुओं की प्रजनन घटनाओं और ब्यांत पर नजर रखता है। यह प्रत्येक गाय के प्रजनन प्रदर्शन की निगरानी करने में मदद करता है।
2. **संतति रजिस्टर**— यह रजिस्टर प्रत्येक गाय की संतति का रिकॉर्ड रखता है। यह पशुओं के आनुवंशिक लक्षणों और विभिन्न ब्लड लाइन्स के प्रदर्शन को ट्रैक करने में मदद करता है।
3. **स्वास्थ्य रजिस्टर**— यह रजिस्टर प्रत्येक गाय की स्वास्थ्य स्थिति और चिकित्सा इतिहास को ट्रैक करता है। यह जानकारी रोग प्रबंधन और रोकथाम के लिए आवश्यक है।
4. **सांड रजिस्टर**— यह रजिस्टर प्रत्येक गाय के प्रजनन के लिए इस्तेमाल किये गए सांड का रिकॉर्ड रखता है। यह प्रजनन कार्यक्रम के प्रबंधन और आनुवंशिक विविधता सुनिश्चित करने में मदद करता है।
5. **शारीरिक भार रजिस्टर**— यह रजिस्टर प्रत्येक गाय के वजन को ट्रैक करता है। यह विकास का अंदाजा लगाने और वजन में किसी भी बदलाव की पहचान करने में मदद करता है जो स्वास्थ्य समस्याओं का संकेत दे सकता है।

### निष्कर्ष

डेरी फार्मिंग में रिकॉर्ड रखना एक महत्वपूर्ण प्रक्रिया है जो पशुओं के स्वास्थ्य और उत्पादकता को सुनिश्चित करने में मदद करता है। यह सुनिश्चित करता है कि सही समय पर उचित देखभाल और उपचार प्रदान किया जा रहा है जिससे उत्पादकता में सुधार के लिए आवश्यक उपाय किए जा सकते हैं। इसलिए, प्रत्येक पशुपालक जो डेरी फार्मिंग से जुड़े हुए हैं, उन्हें अपने फार्म के दैनिक क्रियाकलापों में रिकॉर्ड रखना शामिल करना चाहिए।

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# The 2024 Asia Agri-Tech Expo & Forum Demonstrates Taiwan's Prowess on Smart Farming & Biotechnology, brings in Future and Revolution to Agriculture, Livestock and Aquaculture Industries

Taiwan is renowned for its engineering prowess, manufacturing most of the components used in smart farming, including IoT sensors, solar panels, drones, robotics, and agriculture technology system integrators bringing revolutionary advancements to the field. The 8th Asia Agri-Tech Expo & Forum (AAT) in Taiwan is not just the leading exhibition but a content-rich event in agriculture industry. The event will take place from June 19th to 21st, 2024, at Tainan, Taiwan, running concurrently with Livestock Taiwan and Aquaculture Taiwan.

The expo is supported by central and local governments, as well as associations from related agriculture, aquaculture and livestock industries highlighting the expo's significance in the industry.

With its extensive exhibitor's lineup featuring leading companies, the expo offers a comprehensive showcase. The exhibition is differentiated by country and theme pavilions. Main pavilions have:

- Agriculture Facility Pavilion exhibits premier sustainable greenhouse facilities, environmental control systems, smart agricultural systems, seeds and seedlings, etc.;
- Smart Aquaculture Pavilion reveals the world's first oral gender regulation technology, AI-based underwater monitoring and management system, drone application on smart farming for shrimps and fishes, etc.
- Feed Technology Pavilion has the latest advanced feeds, feed additives, vaccines that provide animal nutrition and immunity enhancement.
- Livestock Farming Pavilion, the largest pavilion among all, displays all kinds of advanced facilities and houses for livestock farming. Notable brands include Moba, WEDA, SkioId, SKOV, VDL Jansen, Cloudfarms, Fancom, Kyowa, Frontmatec, Agrisys, AGI, etc.
- Agri-Machine Pavilion: will showcase the latest research on EV agri-machinery, drones, robotics, just to name a few.



The exhibition offers a comprehensive showcase, products and services.

As part of the expo, a series of professional conferences will be held, addressing key issues and emerging trends in agriculture, livestock, and aquaculture, which include:

- Innovative Aquaculture Management Seminar
- Forum of Taiwan Swine- Precision Farming and Management
- Forum of Advanced Poultry House
- The 2nd edition of Precision Prevention Medication for Animals Forum
- EV Agri-Machinery and Technology Seminar

# Livestock Taiwan

2024/6/19-21  ICC, Tainan, Taiwan

Want to meet 20,000+ professional visitors?  
Joint Livestock Taiwan 2024.

## Exhibits

- Feeds & Feed additives
- Poultry cages
- Animal Health Products
- Livestock Waste Management
- Smart Livestock System
- Farm Management

## Features

- Co-organized with Ministry of Agriculture
- Supported by Local City Government
- 365 Days non-stop marketing through online Showroom



## Activities

Hosted Buyer Program  
Forum on Future Poultry Cages, Animal Nutrition and Disease Prevention  
Matchmaking and Farm Visit  
International and local association networking

## Tainan Sightseeing Bus



In celebration the 400<sup>th</sup> anniversary of Tainan City, night tour sightseeing buses for Tainan cultural attractions or night markets for international exhibitors and buyers during the show periods

Contact us:

Ms. Sophia Lu

Tel: +886-2-2738 3898

Email: [Sophia.lu@informa.com](mailto:Sophia.lu@informa.com)

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# FEEDING THE FUTURE





Industry leaders, experts, and stakeholders come from around the world together. Photo taken from the opening ceremony of 2023.

Attendees can expect valuable and practical insights, and networking opportunities from industry experts and thought leaders.

The 3-in-1 event not only provides a one stop sourcing platform but also cooperation opportunities for international players. "The

world is now in the middle of its biggest agricultural revolution. Been an agricultural research and development leader since the 1960's, Taiwan is an early adopter and innovator in agricultural technologies. With the prowess on IT manufacturing, bio-research achievements, and the know-how on working with the humidity of the tropical climate", said Ms. Sabine Liu, General Manager of the organizer, "Taiwan is set to take a significant role for many of agriculture changes. In addition, located within two hours from China's main cities and 4 hours from Southeast Asia countries, Taiwan is the perfect base for companies looking for partners to enter China or other parts of Southeast Asia markets."

For any interest or inquiries of ASIA AGRI-TECH EXPO & FORUM, please visit the official website at:

<https://www.agritechtaiwan.com> OR

contact Ms. Sophia Lu by phone at +886-2-2738-3839 or

via email to: [aat.sales@informa.com](mailto:aat.sales@informa.com)



A series of professional conferences will be held, addressing key issues and emerging trends in the exhibition.

The 8th edition of Asia Agri-tech Expo & Forum, Livestock Taiwan and Aquaculture takes place from June 19-21, 2024 in Tainan, Taiwan.



# RVC 1977 3<sup>rd</sup> Reunion

## at Shillong Meghalaya 23<sup>rd</sup> Feb 2024

We celebrated our RVC 1977 batchmates 3rd get together with our vet brothers, at Shilong (Meghalaya) on 23rd Feb 2024. Special guest basically from Jammu and Kashmir Retd. Dr VS Sharma presently residing at Shilong with his son working in Army accepted our request to chair as special guest. In addition to our primary get together programme, we also performed entertainment event amongst ourselves including our better halves. The celebration was very successful which is energizing us for tomorrow. Here are certain images as images of yesterday, hope for tomorrow! I hope from our rest colleagues to join us in next meet who could not join us under their any personnel unavoidable circumstances. Thanking all for better happy life in future.



# Smart Mineral, Smart Nutrition, Smart Decision for Efficient growth

By: Dr. Maloshrie Bora, Program Manager – Mineral Nutrition, Trouw Nutrition South Asia

In the dynamic realm of animal nutrition, the role of minerals, especially microminerals, cannot be overemphasized. And this is where the strategic selection of minerals plays a pivotal role in driving efficient growth and maximizing performance. The term "smart minerals" embodies the essence of making informed and calculated decisions regarding the inclusion of essential micronutrients in animal diets. By understanding the nuanced roles of these minerals and their impact on overall nutrition, producers can pave the way for optimal growth, health, and productivity in their livestock.

Modifications in the ecosystem, driven by factors such as climate change, soil composition alterations, and agricultural practices, have significantly impacted the requirements of Trace Minerals(TM) in animal nutrition. These changes have led to shifts in nutrient availability, bioavailability, and absorption, influencing the dietary needs of animals.

An integral management of the farm should consider aspects related to the soil, pasture, and animal to ensure an adequate mineral nutrition. Here are some ways in which ecosystem modifications have influenced TM requirements in animal nutrition:

- 1. Soil Depletion and Mineral Content:** Intensive agricultural practices, including monoculture farming and excessive use of chemical fertilizers, have contributed to soil depletion, and reduced mineral content in forages. As a result, animals grazing on these lands may experience deficiencies in essential TM such as selenium, copper, and zinc, necessitating supplementation in their diets.
- 2. Climate Change and Forage Quality:** Changes in temperature, rainfall patterns, and CO<sub>2</sub> levels can alter mineral uptake by plants, leading to variations in trace mineral concentrations in animal feeds. Producers must monitor and adjust mineral supplementation based on forage quality to meet animal requirements.
- 3. Water Quality and Mineral Interactions:** Alterations in water quality due to pollution, salinity, or mineral imbalances can impact mineral interactions and absorption in the animal's digestive system. Monitoring water sources and considering their mineral content is crucial for maintaining optimal TM levels in livestock.
- 4. Industrial Pollution and Contaminant Exposure:** Industrial activities can introduce contaminants affecting soil and water quality which interfere with mineral absorption and utilization in animals, leading to metabolic disorders. Implementing measures to mitigate pollutant exposure and providing clean, uncontaminated feed and water sources are essential for minimizing adverse effects on TM metabolism.

**5. Genetic Selection and Nutrient Requirements:** Modern breeding practices focus on genetic selection for traits such as growth rate, milk production, and disease resistance. These genetic advancements can influence nutrient requirements, including TM, as animals with higher productivity levels may have increased metabolic demands. Tailoring diets based on genetic factors and performance metrics is crucial for meeting the evolving nutrient needs of genetically improved livestock.

**6. Supplementation Strategies and Nutrient Bioavailability:** Given the complexities of ecosystem modifications, supplementation strategies for TM must be carefully planned. Utilizing bioavailable mineral sources, such as organic or chelated forms, can enhance absorption and utilization in animals, optimizing nutrient delivery and minimizing wastage.

Dairy cow nutrition plays a pivotal role in milk production, reproductive performance, and overall herd health. Among the essential nutrients, TM hold particular significance due to their involvement in various physiological processes. An integrated approach to assessing TM feeding practices in dairy cows is essential for optimizing production efficiency, ensuring animal welfare, and mitigating nutrient imbalances.

## Importance of Trace Minerals in Dairy Cow Nutrition:

Trace minerals (TM), including zinc, copper, selenium, manganese, and iodine, are critical for dairy cow health and productivity. These minerals participate in enzymatic reactions, immune function, antioxidant defence, and hormone synthesis. Deficiencies or excesses of TM can lead to reproductive disorders, impaired immune response, reduced milk production, and compromised hoof and udder health. Therefore, ensuring adequate but not excessive levels of TM in the diet is crucial for maintaining optimal cow performance and welfare.

## Current Scenario of Trace Mineral Feeding management in Dairy Cows:

The role of Trace Minerals (TM) in the animal metabolism, dietary recommendations, current feeding practices, and their excretion in manure pertaining to five TM, i.e., cobalt, copper, iron, manganese, and zinc are the focus areas when discussing the impact of TM feeding management of dairy cows on the ecosystem. The transition period from the dry to the lactating phase is challenging for dairy cattle, and current trace mineral recommendations have been questioned for this period due to the role of some TM in immunity and oxidative metabolism. Furthermore, TM overfeeding is a common practice in intensive dairy production system which is far from precision nutrition. The practice of TM overfeeding could have detrimental effects on the ecosystem when manure with high TM concentrations is repeatedly spread on fields.



# Smart minerals, Smart nutrition, Smart decision

## THE BENEFITS



Increased stability



Improved palatability



Low solubility



Increased bioavailability



Improved digestibility



Minerals are an essential nutrient for production animals. It is very important to feed a stable and highly bioavailable source of trace mineral, in order to optimise health, wellbeing and performance, as well as minimising environmental impact. Our

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### Challenges in Trace Mineral Feeding Practices:

Several challenges are associated with TM feeding practices in dairy cows. These challenges include variability in mineral content of feeds and forages, interactions between minerals affecting bioavailability, environmental factors influencing mineral status, and individual cow variability in nutrient requirements. Additionally, improper formulation or delivery of mineral supplements can result in wastage or inadequate intake by cows, impacting their nutritional status and overall health.

### The Need for an Integrated Approach:

An integrated approach to TM feeding practices involves a comprehensive assessment of multiple factors to develop tailored nutrition strategies for dairy cows. This approach encompasses the following key elements:

#### 1. Nutrient Analysis and Monitoring:

- Conducting regular nutrient analysis of feeds, forages, and water sources to determine mineral content and potential deficiencies.
- Implementing monitoring protocols to assess cow mineral status through blood tests, milk analysis, or tissue sampling.

#### 2. Diet Formulation and Balancing:

- Formulating diets based on cow nutrient requirements, considering factors such as lactation stage, body condition, and production goals.
- Balancing mineral ratios to prevent antagonistic interactions and ensure optimal bioavailability and utilization.

#### 3. Environmental Management:

- Managing environmental factors that impact mineral availability, such as soil quality, water quality, and pasture management practices.
- Implementing soil amendments or supplementation strategies to address deficiencies in grazing areas.

#### 4. Supplementation Strategies:

- Selecting appropriate mineral supplements with high bioavailability and considering delivery methods (e.g., mineral blocks, top-dressing, TMR inclusion) to optimize intake and utilization.
- Adjusting supplementation levels based on seasonal variations, cow performance, and nutrient analysis results.

#### 5. Collaboration and Education:

- Collaborating with nutritionists, veterinarians, and extension specialists to develop and implement effective trace mineral feeding programs.
- Providing ongoing education and training to dairy farm personnel regarding best practices in trace mineral management and feeding.

### Smart Recommendations for mineral supplementation:

Using large quantities of TM in herd management can have harmful impact on the environment if we continue to ignore it and work independently rather than in an integrated manner. The best way to reduce TM concentrations in manure is by achieving TM precision nutrition. However, there are several bottlenecks for TM precision nutrition. It should be no secret that

a major push is underway in the animal nutrition industry to develop products, programs and practices that will significantly reduce the CO<sub>2</sub> emissions of livestock. While much progress has been achieved, there is still a long way to go to achieve the objectives that various government and consumer groups have established as obtainable targets.

One key finding that has emerged so far is that it is highly unlikely that any one product, program or practice will, by itself, achieve the targeted CO<sub>2</sub> reduction objectives that have been set. Rather, the quest to achieve a significant reduction in livestock-based CO<sub>2</sub> emissions will need to be a group endeavour, with several products, programs and practices contributing to a successful outcome.

The use of certain feed additives to reduce CO<sub>2</sub> emissions in dairy cattle is continuing to show promise, based on ongoing research results. When evaluating these additives, it is important to know how they function in the animal to support a lower carbon footprint. Few feed additives used in dairy cattle have been proven via independent research to significantly improve a dairy cow's feed efficiency, thereby reducing the level of methane emissions produced per unit of productivity. Reviews of the results of different additives show that individual additives can deliver a reduction in the animal's carbon footprint ranging from 2% to 12%. While this is positive, no single additive can deliver the 30% reduction the industry is being asked to deliver in the next five to ten years.

How can your TM program contribute to a reduction in CO<sub>2</sub> levels in dairy cattle? Multiple studies conducted at several independent research locations have continued to demonstrate that when Selko IntelliBond Zinc, Copper and Manganese are used to replace Zn, Cu and Mn sulfate in dairy rations, neutral detergent fibre digestibility (NDFd) can be improved by approximately 2 points (see Figure 3). A comprehensive Life Cycle Assessment (LCA) was commissioned to understand the value of replacing sulfate-based TM with Selko IntelliBond Z, C and M on the cow's carbon footprint. Results of the LCA indicated the ability of IntelliBond Z, C and M to help reduce the cow's carbon footprint by up to 2% per kg of ECM (Energy Corrected Milk). Subsequent, independent review verified the findings of the LCA. IntelliBond Z, C and M is therefore the first family of trace minerals to be independently verified to assist with the reduction of the cow's carbon footprint. The methane reduction targets that have been established by authorities and milk processors are certainly challenging and can't be reached by only switching to Selko IntelliBond. The use of Selko IntelliBond is a positive, cost-effective step in the right direction. The reduction of methane emission that can be achieved with Selko IntelliBond does not increase the cost per kg of milk produced. Meeting targets for reduction of methane emissions will require an integrated approach, using a combination of indirect feed additives such as Selko Fytera Balance in combination with Selko IntelliBond. Combining these feed additives with improvements in nutrition, cow management, cow comfort, cropping systems and manure management will enable a dairy farmer to reach environmental targets set by the authorities and by milk processors, while preserving the financial well-being of the farm.

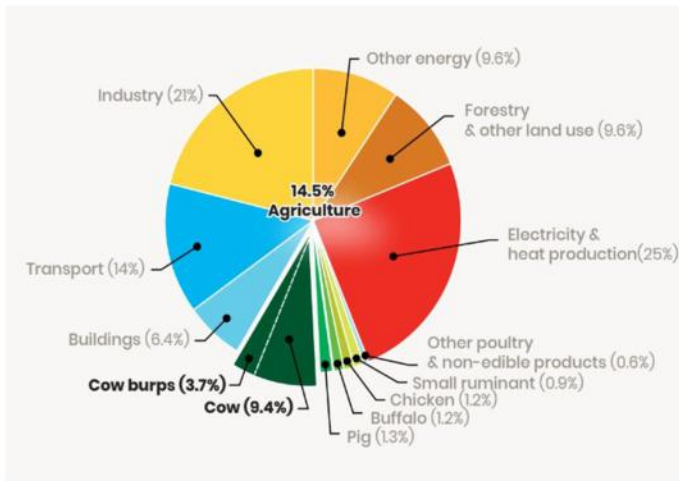


Fig 1: Global Greenhouse Gas Emissions by Economic Sector. Cattle farming is responsible for 9.4% of greenhouse gas emissions.

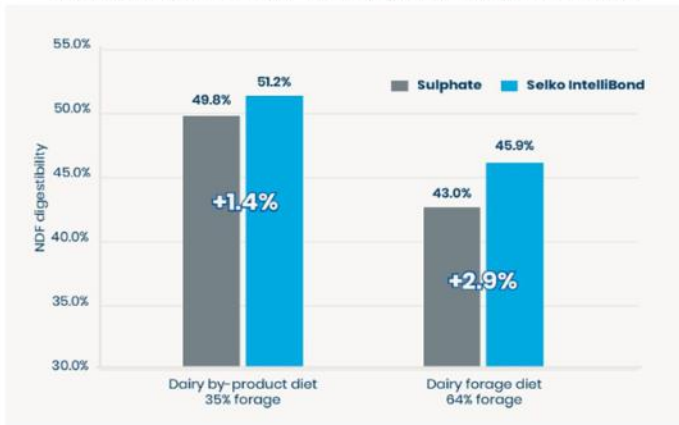


Fig 3: Selko IntelliBond fibre digestibility in cows on a low forage diet and in cows on a high forage diet.

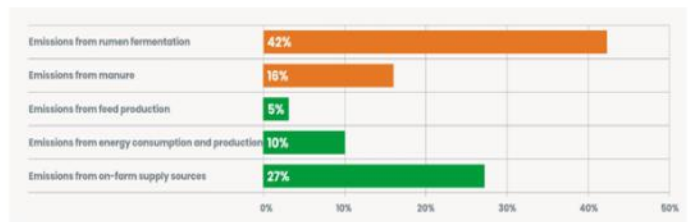


Fig 2: Methane Emission from Cows and other activities in a Dairy Farm. Over 40% of methane produced on a farm is related to rumen fermentation.

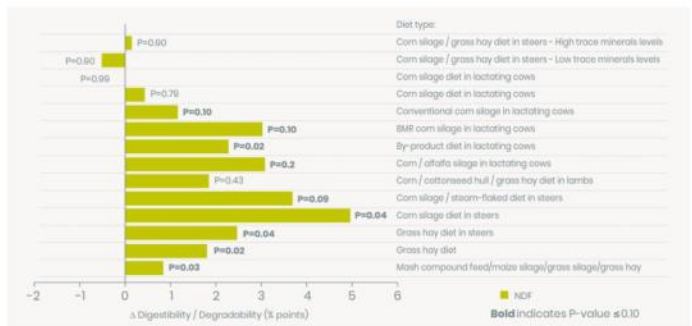


Fig 4: Percentage improvement of Fibre Digestibility in cattle on different diets. A positive effect on fibre digestibility was found in 12 out of 14 studies. Each one-point difference in neutral detergent fibre (NDF) digestibility can represent 0.25 to 0.3 kg of daily Energy Corrected Milk production.

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## Dr. Dinesh Bhosale decided to be Freelancer

NEWS

Dr. Dinesh Tukaram Bhosale is B.V.Sc. & A.H., M.V.Sc., Ph.D.(Animal Nutrition), besides having a Diploma in Business Management. He has been a Member of Extension Council and Research Council of Rajasthan Veterinary University and Maharashtra Animal Fisheries Sciences University; Skill Advisory Board for Dairying, ASCI; BIS animal feeds committee; Editorial board of Journal of Animal Nutrition and Feed Technology; Managing committees of Animal Nutrition Society of India (ANSI) and Animal Nutrition Association (ANA) and Management Committee of ICAR - National Institute of Animal Nutrition and Physiology. He was the Chairman of CLFMA of India, an association of Indian livestock sector during 2012-2014 and was Hon' Secretary during 2008-2012. He was the Organizing Secretary of 2nd national conference of Association of Avian Health Professionals at Pune in 2014, He is working actively with Poultry Federation of India as Vice President - West India since 2006. He is also President of Vets in Private Welfare Association, Pune.

Dinesh worked with Venkateshwara Hatcheries Ltd. in his early career and later as a Technical Director - Poultry, Aquaculture & Livestock for Asia Subcontinent office of American Soybean Association, New Delhi for eight years. Then he worked with Alltech Biotechnology Pvt. Ltd. as Regional Technical Manager - Ruminants for South Asia and Southeast Asia region for two years. He worked as Regional Commercial Director - South Asia for AB Vista, British Company from 2007 till recently. After 30 years of service, he has decided to be freelancer. He will help companies, students, farmers and startups.

He is helping various NGOs like Paani Foundation, Swades Foundation, People Empowering Movement, Bhagirath Gramvikas Prathisthan and companies to promote Animal Husbandry as source of livelihood and as entrepreneurial activity for rural youths and Women SHGs. He is mentoring many startups in livestock sector. He delivered more than 1300 lectures to farmers and entrepreneurs all over India. He conducted Fodder Yatra to promote awareness in five states.

He may be contacted on +91 9860315558 and [dtbhosale@gmail.com](mailto:dtbhosale@gmail.com).



# IMPACT OF GLOBAL CLIMATE CHANGE ON LIVESTOCK PRODUCTION AND HEALTH

Prof. Dr. R.N. Sreenivas Gowda\*

*Public are facing unusual rise in global temperatures this year, even many cities are facing acute shortage of water, but it was different in the year 2022 and 2023 where there was heavy rains and floods in many parts of our country. The experts are of the opinion that it is due to climate change in recent years, the livestock is also no exception, hence this paper to find the effect of global warming and climate change on livestock.*

Climate affects livestock growth rates, milk and egg production, reproductive performance, morbidity, and mortality, along with feed supply. Simultaneously, livestock is a climate change driver, generating 14.5% of total anthropogenic Greenhouse Gas (GHG) emissions.

Climate change is the complex and multidisciplinary change in global or regional climate patterns, which pose a significant risk for human and natural systems, it is similarly threaten livestock production and productive performance. The climate change is primarily due to an increase of global atmospheric temperature and greenhouse gases mostly carbon dioxide (CO<sub>2</sub>) concentration, precipitation variation, and/or permutation of these factors (Henry et al., 2012). The distribution of infectious diseases, (human, animal and plant) and the timing and intensity of disease outbreaks are often closely linked to climate. Climate change may affect livestock disease through several pathways. Climate change impacts livestock directly (for example through heat stress and increased morbidity and mortality) and indirectly (for example through quality and availability of feed and forages, and animal diseases).

## Definitions

Global warming is the slow increase in the average temperature of the earth's atmosphere because an increased amount of the energy (heat) striking the earth from the sun is being trapped in the atmosphere and not radiated out into space. Increase of 1o C will cause significant changes in the environment. Changes in temperature, rainfall patterns, and other environmental factors are affecting the habitats, migration patterns, and populations of many species. As a result, wildlife is facing numerous threats, from habitat loss and fragmentation to species decline and extinction.

Climate change is an association of multidimensional effects on climate including physical characteristics, causes, and consequences (Visschers, 2018). Climate change is defined as an average weather condition of an area that is characterized by its own internal dynamics, and it can affect by changing its external factors. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as the change resulting from long-term direct and indirect activities that induce changes

in the compared time, which are much more than the natural change (UNFCCC, 1992).

Factors responsible for climate change and global warming

Burning fossil fuels, cutting down forests and farming livestock are increasingly influencing the climate and the earth's temperature. The main driver of climate change is the greenhouse effect. Some gases in the Earth's atmosphere act a bit like the glass in a greenhouse, trapping the sun's heat and stopping it from leaking back into space and causing global warming. The most common greenhouse gases (GHG) covered under the Kyoto Protocol are:

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF<sub>6</sub>)

Nitrogen trifluoride (NF<sub>3</sub>)

**Effect of global warming are:**

- Disappearing glaciers, early snowmelt, and severe droughts will cause more dramatic water shortages
- Rising sea levels will lead to even more coastal flooding
- Depletion of forests, farms, and cities will face troublesome new pests, heat waves, heavy downpours, and continue to increase the risk of wildfires.
- Increased rains and flooding. All of these can damage or destroy agriculture and fisheries.
- Disruption of habitats such as coral reefs, mountains, meadows and forests could drive many plant and animal species to extinction.
- Increase in Allergies, asthma, and infectious disease outbreaks will become more common due to higher levels of air pollution, and the spread of conditions favorable to pathogens and mosquitoes.

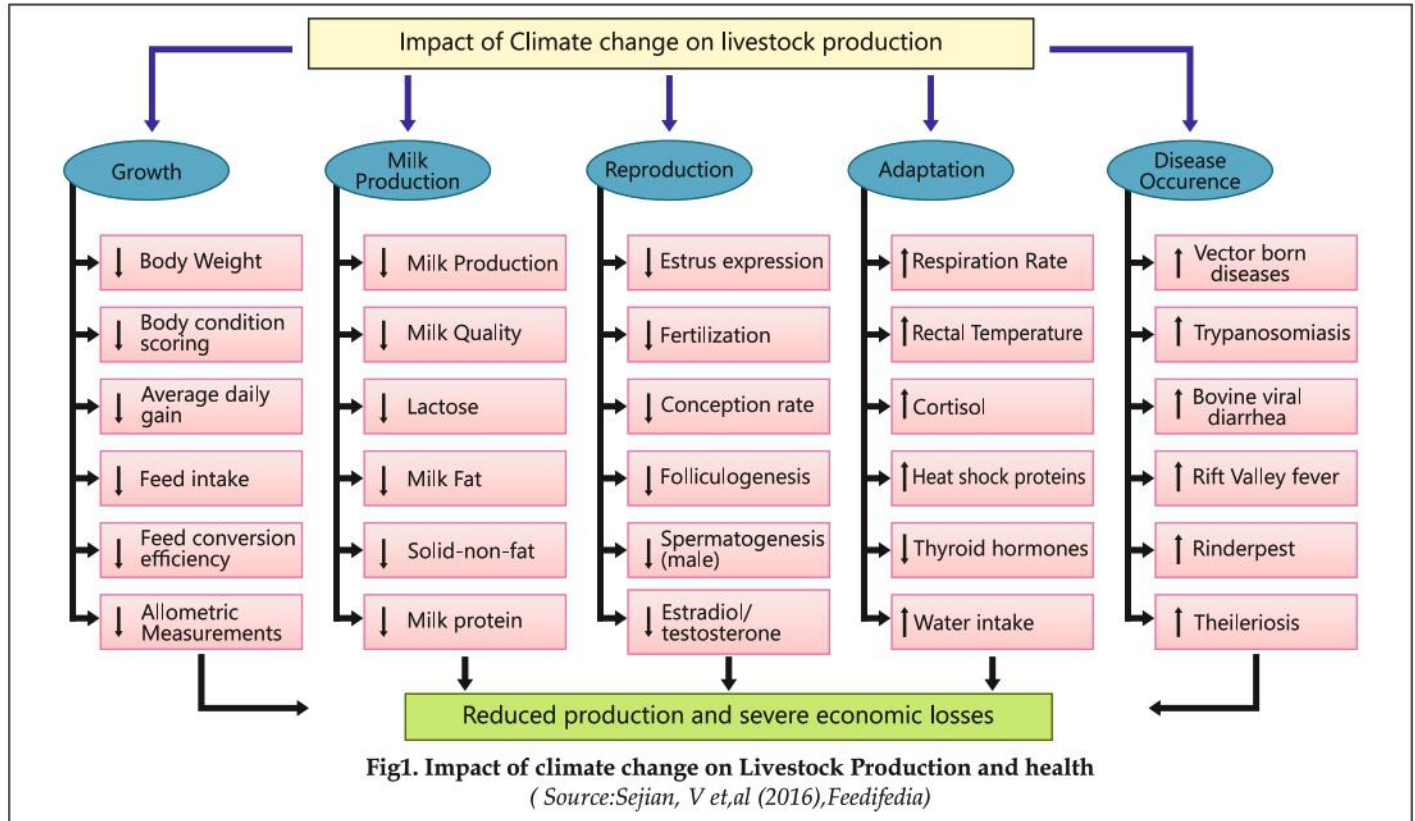
### Impact on animal health

Climate change will have many knock-on effects on production both directly and indirectly, and are all depicted in the fig1.

The direct effect of climate change on livestock health includes temperature related to frequent disease incidence and death. The indirect effect follows more intricate pathways and includes the climate influences on pathogen density and distribution and

multiplication of vectors as well as vector-borne diseases and soil-, food-, and water-borne diseases. The climate change on livestock could cause both direct and indirect effects (Table 1 & 2, Fig1.).

The direct effects of climate on animal disease are likely to be most pronounced for diseases that are vector-borne, soil associated, water or flood associated, rodent associated, or air temperature/humidity associated and sensitive to climate (Grace et al., 2015).



**Table 1, Direct effect of climate change on livestock**

Sl No.	Cause	Effect
1	Heat stress	a) increased body temperature and respiration rates. b) Decrease in feed intake and milk production
2	Metabolic disorders	a) Ketosis b) Lameness
3	Oxidative stress	a) Decrease in serum antioxidant levels b) Reduction of carotenes and Vitamin E levels. c) increased activity of antioxidant enzymes such as superoxide glutathione, dismutase, and catalase peroxidase. d) ROS such as hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ), superoxide anions (O <sub>2</sub> <sup>-</sup> ), and hydroxyl radicals (OH <sup>-</sup> ) have a negative impact on lipid peroxidation, and the enzyme inactivation process causes cell damage
4	Immuno- suppression	a) Impair immune response in poultry. b) reduced colostrum immunoglobulins such as IgG and IgA in dairy cows. c) Depression in lymphocyte function that hampers the efficacy of vaccinations. d) Impaired function of neutrophils that are important for defense against bacteria. e) High prevalence of the resistance of bacteria to most antibiotics. f) Increase in mastitis incidence
5	Effect on production	a) Alters the production of different hormones. b) Increased incidence of post-partum anoestrus in cattle. c) Decrease in milk production d) Seasonal infertility and Impaired reproductive disturbances in pigs. e) Impacts semen quality, oestrus cycle and oocyst and embryo development.
6	Mortality	increased mortality incidence in all species of animals during extreme weather situation

**Table 2. Indirect effect of climate change**

	Cause	Effect
1	Vectors	Increase in vector-borne pests such as midges, flies, ticks, and mosquitoes and positively affect the spatial distribution of vectors.
2	Vector-borne diseases	increase the geographic spread of vector-borne diseases such as bluetongue, lumpy skin diseases (LSDs), anaplasmosis, babesiosis, and theileriosis.
3	Hemoprotozoan infections	Increase protozoal infections such as Babesia spp., Anaplasma spp., and Theileria spp. cause health hazard of livestock in tropical countries.
4	Parasites and Helminths	a) Increase in Haemonchus contortus in the tropical regions b) Ascaris suum eggs through enhanced embryonation becomes accelerated when ambient temperature increases. c) Influence the rapid development of parasites in their invertebrate intermediate hosts like snails. d) lifecycle of lungworms is also increases the incidence in the summer/autumn than the winter season. e) Increase in the activity of Fascioliasis, schistosomiasis, and nematodiasis including heterakiasis and different trichostrongyliases.
5	Other pathogens	Increase in black quarter, dermatophiloses, and anthrax.
6	Mycotoxins	a) The major mycotoxins Produced in adverse climate change are: aflatoxin, ochratoxin, T2, fumonisin, and zearalenone, which are a metabolic product of mycotoxicogenic molds produced at the optimum temperature of 25°C–37°C and humidity of 80%–85%. b) Aflatoxin type B1 is more toxic and has a significant public health impact due to hepatotoxic and its carcinogenic properties in humans.

In most cases, the impact of heat stress is reduced productivity and animal welfare. However, under severe or prolonged conditions, mortalities will also occur. Reduced feed intake is one of the first and biggest consequences of heat stress, leading to declines in growth rates and production of milk or eggs.

**Conclusion**

Climate change is now a global concern due to its multidimensional effects and impact on humans, animals, plants,

and environment. Research has established that changes in global or regional climate patterns due to climate change are affecting livestock health directly and indirectly. Changes in management, technologies and infrastructure may be necessary to ensure animal production is resilient to climate change effects. The appropriate means of adaption will be dependent on the location, sector and production system. A proactive approach is key to the management of climate risks.



**SELVAN KANNAN**  
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## EVENT CALENDER

**JUNE 2024**  
**19 - 21 LIVESTOCK TAIWAN**  
**Venue :** ICC Tainan, Taiwan  
**Phone :** +886-2-273803898  
**Email :** sophia.lu@informa.com  
**Web :** www.agritechtaiwan.com

**SEPTEMBER 2024**  
**17 - 19 SPACE 2024**  
**Venue :** The International Exhibition For Animal Farming, Rennes France Europe  
**Phone :** +33 (0)2 23 48 28 80  
**Email :** info@space.fr  
**Web :** www.uk.space.fr

**OCTOBER 2024**  
**01 - 04 WORLD DAIRY EXPO**  
**Venue :** Alliant Energy Center Madison, Wisconsin, USA  
**Phone :** 608-224-6455  
**Email :** wde@wdexpo.com  
**Web :** www.worlddairyexpo.com





# DAIRY NUTRICON

## Fostering Collaboration & Knowledge Exchange



In the ever-evolving landscape of animal health, Huvepharma®, a global leader, has taken a significant stride towards the future. The company has broadened its scientific direction to delve into the concept of food safety, aiming to shape and popularize the future direction of the food business. In line with this vision, Huvepharma® hosted a conference titled “Dairy Nutricon-Fostering Collaboration and Knowledge Exchange”. This conference served as a platform for experts, innovators, and thought leaders to come together, share insights, and discuss the future of the dairy industry. Here we encapsulate the key highlights and learnings from this momentous event.





## Product Launch Ceremony

The conference was marked by a significant event as Huvepharma unveiled their latest product, UBS 60, in the dairy segment. The introduction of UBS 60 is expected to bring about transformative changes in dairy farming practices. The ceremony was well-received by the attendees, and the enthusiasm for the new product was palpable. This momentous occasion reflected the successful launch and the positive reception it received during the conference.





# Special Felicitation

Huvepharma® has honored, recognized, and felicitated several distinguished personalities from the dairy industry. Their monumental contributions to the dairy field have significantly propelled the industry forward.

Mr. Edmud Vincent Piper



Mr. Yogesh Godbole



Dr. Someshwar Zadbuke



Dr. Valentin Nenov



Dr. Chirag Mistry



Dr. Angad Ravandale



Dr. Nitin Tyagi



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