

LIVESTOCK TECHNOLOGY

Pulse of Livestock Industry

RNI No.: HARBIL/2009/27481

www.srpublication.com

POSTAL REGN. NO. PKL-142/2025-2027

Rs. 15/-

LT

NOVEMBER 2025

VOL.- 15 ISSUE 6

DISPATCH DATE

07 NOVEMBER 2025

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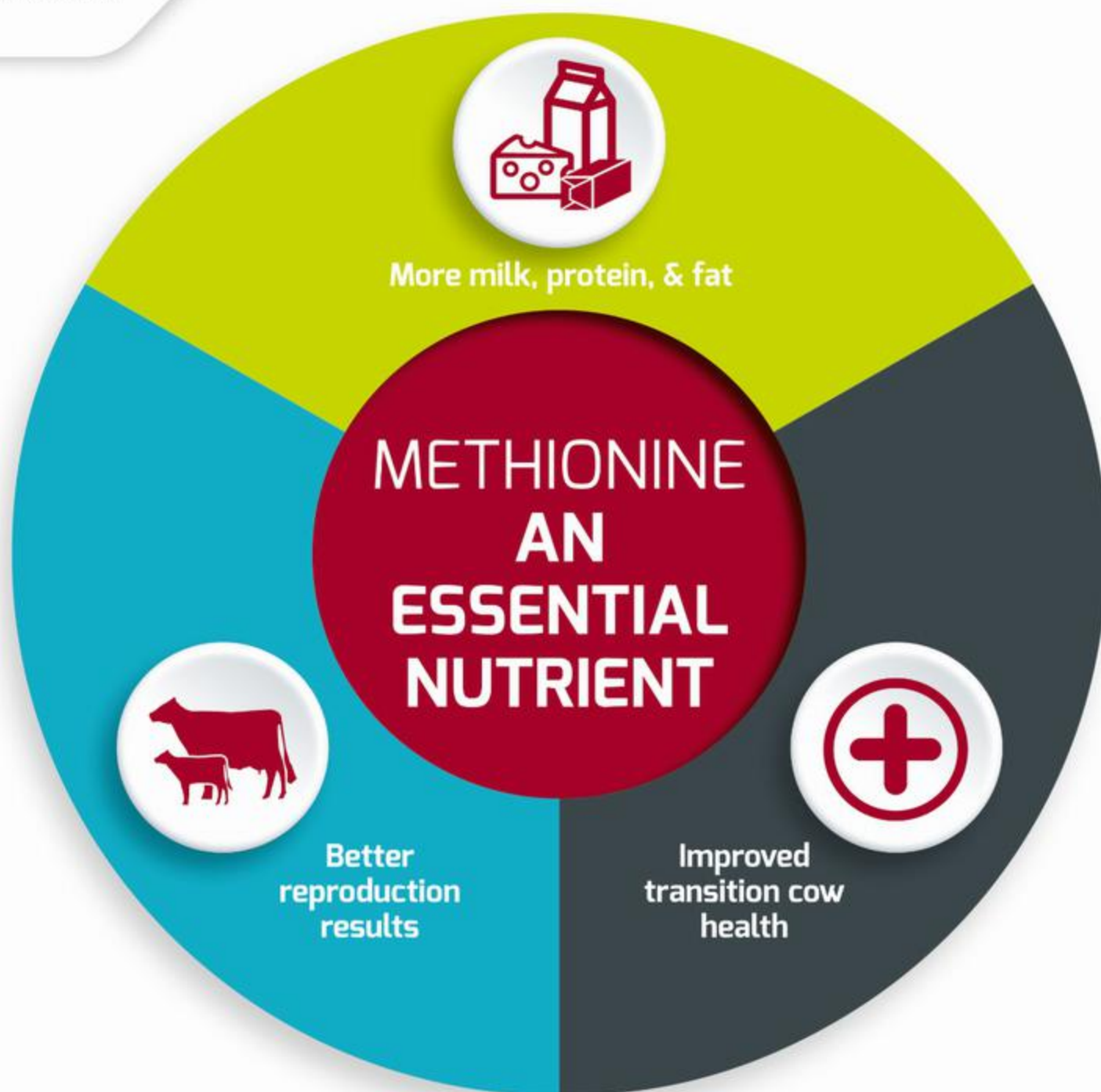
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As per I-MARC data, with a market valued at INR 18,975 billion in 2024, projected to reach INR 57,001 billion by 2033 (CAGR 12.35%), the Indian dairy sector is an economic engine benefiting over 80 million farmers and capturing the attention of global investors. Leading brands such as Amul and Mother Dairy have already reduced prices, which could increase sales by 10-15% in the last quarter of 2025. This move not only benefits urban consumers, but also strengthens India's export competitiveness, which already accounts for 10% of the global dairy market. Urbanization and demand for healthy foods are triggering interest in value-added dairy products. Probiotic yoghurts, vitamin-fortified milk and even camel ice cream are gaining ground, with demand for these products expected to increase by 20% by 2024. The Indian dairy sector is a magnet for investment. For consumers, lower prices and a variety of functional products promise a richer and healthier experience.

The CLFMA of India delegation visited the United States to study sorghum, corn, and dairy farming practices and engage with top agricultural stakeholders. Meetings included live farm demonstrations, industry interactions, and discussions with senior U.S. officials, including the Governor and Agriculture Secretary of Iowa. The visit reinforces ongoing MoUs between CLFMA, the State of Iowa, and Maharashtra, promoting knowledge exchange and bilateral cooperation. This visit provided invaluable insights into advanced agricultural practices, particularly in sorghum, corn, and dairy production. With India's animal feed market valued at approximately USD 14.34 billion in 2024 and projected to reach USD 21.02 billion by 2034, the need for sustainable and efficient feed solutions is paramount. Engaging with U.S. counterparts has highlighted the importance of knowledge exchange in addressing challenges such as feed shortages and productivity gaps. By adopting proven practices and fostering international collaboration, CLFMA aims to enhance the sustainability and competitiveness of India's livestock sector.

By 2023-24, India's per capita milk availability had reached 471 grams/day, ahead of the global average of 394 grams/day. In the same period, India's milk production surged by 63.6%, rising from 146.3 million tonnes in 2014-15 to 239.3 million tonnes. In Tamil Nadu, the dairy sector is also expanding rapidly. The state ranks 11th in milk production, and 4th in cooperative milk procurement within India. Its milk production grew from 8.75 million tonnes in 2020 to 10.8 million tonnes in 2024. The dairy market in Tamil Nadu was valued at ₹1,38,070 crore in 2024 and is projected to reach ₹4,23,700 crore by 2033, growing at a CAGR of 12.61% between 2025 and 2033. Among private sector players, Hatsun Agro Product Ltd (India's largest private dairy) reported revenue of ₹8,699 crore in the last year. It currently processes over 40 lakh litres of milk daily and operates across six states. Milky Mist Dairy Foods Pvt Ltd recorded revenue of ₹2,349 crore in 2024-25. It has diversified into products including cheese, butter, ghee, yogurt, UHT items, frozen & ready-to-eat foods, and chocolates. Its paneer plant in Erode has a capacity of 150 tonnes/day, which is claimed to be the largest in India. Between April 2022 and March 2025, Milky Mist exported to more than 15 countries, including the US, Singapore, West Asia, and Australia. Other private players from outside Tamil Nadu are also active: Akshayakalpa Organic (based in Tiptur, Karnataka) earns - ₹40 crore/month revenue, with -25% of its monthly revenues coming from Chennai and Hyderabad markets. It currently processes about 2.8 lakh litres/day across its facilities in Karnataka, Tamil Nadu, and a planned plant in Telangana. Organized sector share in Tamil Nadu is estimated at over 35%, while in Uttar Pradesh, although UP has the highest milk production in India, only -10% of its dairy market is in the organized sector. Among states, Tamil Nadu pays the highest procurement (farmgate) price to farmers.

Giving a major push to India's livestock and dairy sector, projects worth ₹947 crores were inaugurated and foundation stone was laid for additional projects valued at ₹219 crore in October. These initiatives, which form part of a larger package of agricultural and allied sector investments, were launched by the Prime Minister. These projects were dedicated to the nation alongside the launch of two major agriculture schemes - the Pradhan Mantri Dhan Dhanya Krishi Yojana (PM-DDKY) and the Mission for Atma Nirbharta in Pulses, reflecting the government's commitment to strengthening rural livelihoods and advancing India's goal of self-reliance in the Agri-allied sectors. One of the key highlights was the inauguration of the first IVF Laboratory in the North-Eastern Region, established in Guwahati, Assam under the Rashtriya Gokul Mission (RGM) with an investment of ₹28.93 crore. This state-of-the-art facility will provide a major impetus to dairy development and breed improvement in the northeastern states. To reinforce last-mile delivery of breeding services, 2,000 newly trained and equipped MAITRIs (Multipurpose Artificial Insemination Technicians in Rural India) from all districts of Uttar Pradesh were awarded certificates by the Prime Minister under the Rashtriya Gokul Mission. The event also marked the induction of over 38,000 MAITRIs across India, representing a major milestone in improving artificial insemination coverage and genetic upgradation of livestock nationwide.

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**POULTRY TECHNOLOGY
LIVESTOCK
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**NOVEMBER 2025
VOLUME-15, ISSUE-6
RNI NO. HARBIL/2009/27481**

The Views expressed in this issue are of the contributors and not necessarily those of the magazine. Though every care has been taken to ensure the accuracy and authenticity of information, Livestock Technology is, however, not responsible for damages caused by misinterpretation of information express or implied, within the pages of the magazine.

Owned, printed, published & edited by Dinesh Kumar, C/o S.R. Publications, published at 1325, 2nd Floor, Sector 32, Near Hotel Noor Mahal, Karnal. Printed at Khattar Printing Press, Railway Road, Karnal - 132 001 (Haryana)



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07



Ruminant Efficiency Summit 2.0

Lallemand Animal Nutrition along with his valued partner Progressive Dairy Solution Ltd had successfully hosted a Feed efficiency Summit 2.0 on Feed Processing and nutrition to maximise rumen efficacy and with the new genetic improvement in dairy, so to get prepare ourself for the next generation in dairy feeds in Kasauli.

The invited guest were the leading dairy feed manufacturers from all over India.

The event began with the warm welcome and introduction by Mr Munish Sharma (GM PDS Ltd). He also added the importance of advance nutrition and farming practice in dairy. After this, Mr Kapil Manwal (Commercial Director, LAN South Asia) emphasises guests with new genetic improvements in dairy and how we need to get ready for the next generation in dairy feed.

The two speakers, Mr Mathieu Rolland who is dairy nutritionist and a leading consultant in Europe, Vietnam,

Thailand, China and Southeast Asia spoke on insights of rumen nutrition and feed efficiency. He also described how to improve daily feed intake for high yielding cows to get efficiency of 2 kg milk with 1 kg DMI and Mr Aurelion Piron discussed how a rumen specific yeast can help to make rumen healthy.

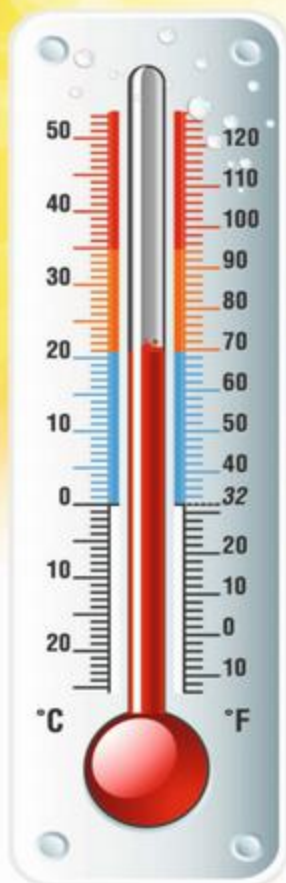
The session concluded with the vote of thanks by Sardar Daljit Singh (President PDFA, Punjab). He also added how the PDFA farmers able to get the good yield and good nutrition and secondly, he described the good growth in dairy sector and challenges in coming years.

Lastly, Mr Ashok Gupta (president AFMA) also thanks for this wonderful summit and to get prepare for a future for dairy feed in India.

This event went successful with insights and expertise talk made the event both informative and energising. Lallemand truly appreciate the valuable contribution and the active participation from all attendees



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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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दुधारू पशुओं में लैंगिक वीर्य की उपयोगिता एवं समस्याएं

अमित शर्मा, अंकित आहूजा*, ईवा शर्मा, शगुन ठाकुर, पंकज सूद

लैंगिक वीर्य वह वीर्य (सीमन) होता है जिसमें एक्स और वाई क्रोमोसोम वाले शुक्राणुओं को अलग कर दिया जाता है। सरल भाषा में समझें तो एक्स क्रोमोसोम युक्त शुक्राणुओं से मादा पैदा होती है और वाई क्रोमोसोम युक्त शुक्राणुओं से नर पैदा होता है। इन दोनों क्रोमोसोम को अलग-अलग कर देने से मनचाहा लिंग उत्पन्न करने में सहायता मिलती है। प्राकृतिक स्थिति में मादा और नर के जन्म की संभावना लगभग बराबर (50%) होती है, लेकिन सेक्सड सीमेन तकनीक से नरधमादा पैदा होने की संभावना 85-90% तक बढ़ जाती है। सेक्सड सीमन पशु प्रजनन के क्षेत्र में एक क्रान्तिकारी तकनीक है, इसके प्रयोग से मादा बछड़े के जन्म की संभावना बढ़ जाती है, जो डेयरी उद्योग के लिए सबसे महत्वपूर्ण है।

लिंग चयन तभी संभव है जब हमें X और Y क्रोमोसोम युक्त शुक्राणु के बीच का अंतर पता हो। यदि हम यह पहचान लें कि कौन-सा शुक्राणु है और कौन सा नर शुक्राणु है, तो हमें मनचाहा परिणाम मिल सकता है।

मापदण्ड	X/Y क्रोमोसोम युक्त शुक्राणु
शुक्राणु का आकार	X शुक्राणु का आकार बड़ा होता है।
DNA की मात्रा	X शुक्राणु में 3.8-4.2% DNA अधिक होता है
शुक्राणु की गति	Y शुक्राणु तेज गति से चलते हैं।
X शुक्राणु का सतही आवेश (surface charge)	नकारात्मक
कोशिका सतह पर एंटीजन की उपस्थिति (HY)	यह केवल Y शुक्राणु में पाया जाता है

सेक्सड सीमन बनाने की विधियाँ:

सेक्सड वीर्य बनाने के लिए विभिन्न तकनीकों का उपयोग किया जाता है, जैसे सेक्सड सीमन फ्लो साइटोमीट्री, स्विम अप प्रक्रिया, एल्ब्यूमिन ग्रेडिएंट या ग्रेडिएंट स्विम डाउन प्रक्रिया, पकॉल डेंसिटी ग्रेडिएंट विधि, फ्री फ्लो इलेक्ट्रोफोरेसिस, H-Y एंटीजन की पहचान। ज्यादातर फ्लो साइटोमीट्री विधि का प्रयोग कर सेक्सिंग की जाती है।

फ्लो साइटोमीट्री आधारित वीर्य (स्पर्म) सेक्सिंग तकनीक

सर्वप्रथम कृत्रिम योनि तकनीक का उपयोग करके नर पशुओं से वीर्य एकत्र किया जाता है। इस तकनीक में प्रत्येक स्पर्म को डीएनए-बाइंडिंग फ्लोरोसेंट डाई (जैसे Hoechst 33342) से रंगा जाता है। एकत्रित वीर्य को एक विशेष फ्लो साइटोमीटर मशीन में डाला जाता है। तत्पश्चात प्रत्येक शुक्राणु को एक फ्लो चैनल से गुजारा जाता है, जहाँ उन्हें यूवी लेजर से रोशन किया जाता है। चूंकि X क्रोमोसोम वाले शुक्राणु में Y की तुलना में लगभग 3-8%-4.2% अधिक DNA होता है, इसलिए वे अधिक फ्लोरोसेंस दिखाते हैं। लेजर बीम द्वारा शुक्राणुओं की फ्लोरोसेंस को कंप्यूटर के माध्यम से मापा जाता है और फिर उन्हें इलेक्ट्रोस्टैटिक चार्ज देकर अलग किया जाता है। इस प्रक्रिया से 90%

तक सटीकता के साथ X या Y क्रोमोसोम युक्त शुक्राणु अलग किए जा सकते हैं। चुने गए शुक्राणुओं से "सेक्सड सीमेन" की तृण बनाई जाती है, जिन्हें तरल नाइट्रोजन में सुरक्षित रखकर किसानों के लिए कृत्रिम गर्भाधान में इस्तेमाल किया जाता है।

फलो साइटोमीट्री की सीमाएँ:

उच्च लागत— इस तकनीक के लिए अत्याधुनिक मशीनें और लेजर सिस्टम चाहिए, जो बहुत महंगे होते हैं।

विशेषज्ञ तकनीशियन की आवश्यकता— इसका संचालन करने के लिए प्रशिक्षित वैज्ञानिक/तकनीशियन की जरूरत होती है।

सीमित उत्पादन क्षमता— शुक्राणुओं की छंटई (sorting) की धीमी गति (15 million sperms/hr) के कारण एक बार में सीमित संख्या में ही शुक्राणुओं को प्रोसेस या वर्गीकृत किया जा सकता है, जिससे पूरी प्रक्रिया में अपेक्षा से अधिक समय लगता है, अंततः सीमित उत्पादन होता है।

शुक्राणुओं को क्षति का खतरा— फलो साइटोमीट्री में लेजर और डाई (dye) का उपयोग होता है, जिससे कुछ शुक्राणु क्षतिग्रस्त हो सकते हैं और उनकी जीवित रहने की क्षमता कम हो सकती है।

सभी X या Y क्रोमोसोम वाले शुक्राणु की पहचान नहीं हो पाती— आमतौर पर केवल लगभग 40-50% से लेकर 85-95% तक ही सही X या Y क्रोमोसोम वाले शुक्राणु की पहचान होती है, जो तकनीक और उपकरण की सीमा पर निर्भर करती है।

सीमित उपयोग योग्य नमूना— मूल वीर्य नमूने (semen sample) का केवल 20-30% हिस्सा ही सेक्सड सीमन (X/Y) के रूप में उपयोग या बाजार में लाया जा सकता है।

सेक्सड सीमन की उपयोगिता:

मनचाहे लिंग के बछड़े/बछड़ी का उत्पादन (डेयरी या बीफ पशु)।

मादा बछड़ों की अधिकता से दूध उत्पादन बढ़ता है, जिससे किसान की आय में वृद्धि होती है।

ब्याई गई मादा बछड़ियों का संतति परीक्षण (progeny testing) कम समय में किया जा सकता है।

प्राकृतिक जनसंख्या में नर बछड़ों की अत्यधिक वृद्धि से होने वाली समस्याओं जैसे फसलों को नुकसान, सड़क दुर्घटनाएं आदि में कमी आती है, जिससे पर्यावरण की सुरक्षा और संतुलन में सुधार होता है।

उत्तम गुणवत्ता वाले सांडों (superior bulls) का उत्पादन किया जा सकता है।

सेक्सड सीमन के प्रयोग से कठिन प्रसव (dystocia) की संभावना कम रहती है, क्योंकि नर बछड़ों के उत्पादन को रोका जा सकता है।

इन-विट्रो फर्टिलाइजेशन कार्यक्रम में, सेक्सड सीमन की एक खुराक से मनचाहे लिंग के अनेक भ्रूण तैयार किए जा सकते हैं।

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13

 **EVONIK**
Leading Beyond Chemistry

इस तकनीक के प्रयोग से बाहरी पशुओं को खरीदने की आवश्यकता कम हो जाती है, जिससे बीमारियों की रोकथाम में भी मदद मिलती है।

सेक्स सीमन की समस्याएं:

फर्टिलिटी/गर्भधारण दर में कमी:— सेक्स सीमन का गर्भधारण दर (conception rate) सामान्य सीमन की तुलना में 10-15% कम होता है। इसके दो मुख्य कारण हैं— सेक्स सीमन में शुक्राणुओं की कम मात्रा एवं सेक्स शुक्राणुओं की कम अर्ध-आयु (half-life)

सेक्स सीमन में शुक्राणुओं की कम मात्रा: सेक्स तृण में सिर्फ 2 मिलियन शुक्राणु होते हैं, जबकि सामान्य तृण में 20 मिलियन। जिससे गर्भधारण की संभावना कम हो जाती है।

सेक्स शुक्राणुओं की कम अर्ध-आयु (half-life): मादा प्रजनन तंत्र में पारंपरिक रूप से प्रोसेस किए गए शुक्राणुओं की तुलना में सेक्स शुक्राणुओं की अर्ध-आयु कम होती है।

सेक्स तृण की कीमत सामान्य तृण से अधिक होती है। सामान्य तृण कीमत— ₹150, सेक्स तृण ₹1500–3000 शुक्राणु वर्गीकरण की प्रक्रिया के दौरान लगभग 50% शुक्राणुओं की हानि होती है, जिससे कुल उपयोगी मात्रा में उल्लेखनीय कमी आती है।

सेक्स तृण का उपयोग खराब प्रजनन प्रदर्शन वाले झुंडों, जन्मजात एवं मूलभूत बांझपन और दूध पिलाती गायों के पशुओं में वर्जित है। सेक्स तृण का उपयोग केवल उन बछड़ियों में किया जाना चाहिए, जो समुचित प्रबंधन, उत्तम शारीरिक स्थिति (Body Condition Score), स्पष्ट एवं समयानुकूल हीट संकेतों की उपस्थिति और प्रजनन दृष्टि से सक्षम हों।

भविष्य की चुनौतियाँ एवं संभावनाएँ:

शुक्राणु लिंग निर्धारण तकनीक की लागत को कम करना— शुक्राणु वर्गीकरण की प्रक्रिया को अधिक सुलभ एवं आर्थिक रूप से व्यवहार्य बनाने हेतु नवाचार आवश्यक है।

बहु-नोजल युक्त फ्लो साइटोमीटर का विकास— फ्लो साइटोमेट्री में दक्षता वृद्धि हेतु ऐसे उपकरणों का निर्माण जो एक से ज्यादा नोजल्स के माध्यम से उच्च गति एवं सटीकता से शुक्राणुओं का वर्गीकरण कर सकें।

X अथवा Y शुक्राणुओं के विशिष्ट प्रोटीन मार्कर की पहचान— लिंग-विशिष्ट शुक्राणुओं की पहचान के लिए जैव-रासायनिक संकेतकों (बायोमार्कर्स) का पृथक्करण, जिससे चयन प्रक्रिया को आणविक (उवसमबनसंत) स्तर पर सुदृढ़ किया जा सके।

निष्कर्ष:

सेक्स तृण का उपयोग मुख्य रूप से उच्च गुणवत्ता, स्वस्थ और बेहतर प्रजनन प्रदर्शन वाले झुंडों में अनुभवी और प्रशिक्षित कर्मियों द्वारा ही किया जाना चाहिए, ताकि सर्वोत्तम परिणाम प्राप्त हो सकें और डेयरी फार्मिंग की आर्थिक दक्षता बढ़ाई जा सके। इस तकनीक के उपयोग से किसानों को मादा पशु परिवार बढ़ाने में मदद मिलती है, जिससे दुग्ध उत्पादन में वृद्धि होती है और नर पशुओं के पालन में होने वाली परेशानी और खर्च से बचा जा सकता है। भारत में यह तकनीक अब व्यापक रूप से उपलब्ध है, और कई राज्यों के पशुपालन विभागों द्वारा इसे किसानों को आर्थिक सहायता के तहत कम मूल्य पर प्रदान किया जा रहा है। भारत में इस तकनीक के लिए कई अनुसंधान और विकास कार्य चल रहे हैं ताकि यह तकनीक और अधिक किफायती और प्रभावी हो सके।

EVENT CALENDER

NOVEMBER 2025

19-21 NOVEMBER – ANSICON

Venue : C.V.Sc. & A.H., A.N.D.U.A. & T.,
Kumargaj, Ayodhya (U.P.), India

Name : Dr. V.K. Singh (Organizing Secretary)

Phone : +91 7068583719, 9452284121, 9456906902

Name : Dr. Udaybir Singh Chahal

Phone : +91 98885 45098

Email : info@ippexpo.org

Web : www.ippexpo.org



JANUARY 2026

27-29 JANUARY – IPPE

Venue : Georgia World Congress Center,
285 Andrew Young
International Blvd NW

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Email : info@ippexpo.org

Web : www.ippexpo.org



MARCH 2026

10-12 MARCH – VICTAM ASIA

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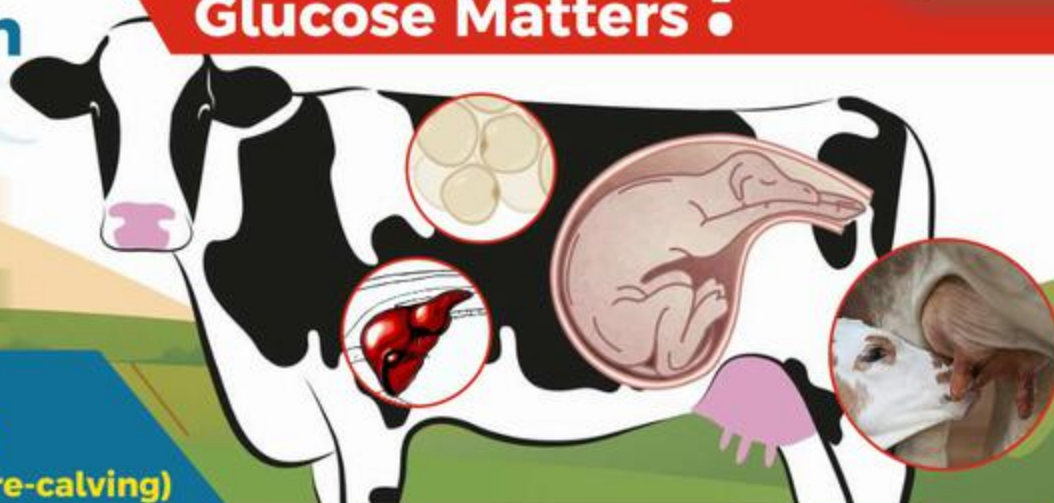


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The Transition Period

Why Close-Up Glucose Matters?



especially the
close-up phase
(last 21 days pre-calving)

is the most metabolically demanding window of a dairy cow's life. Energy demands rise while dry matter intake (DMI) falls, creating a strong negative energy balance. Glucose is the primary fuel for fetal growth, colostrum formation, and the cow's immune system. If glucose supply is inadequate, the liver mobilizes fat, leading to elevated non-esterified fatty acids (NEFA) and **beta-hydroxybutyrate (BHB)**, increasing the risk of subclinical or clinical ketosis, fatty liver, metritis, and impaired fertility.

But monitoring glucose in dairy cows is not as simple as
"just use a human glucometer."



Understanding what we measure and how to interpret it is critical for effective transition cow management.

Body Condition Score (BCS) and Glucose - The First Clue

BCS is the simplest, most cost-effective screening tool to anticipate energy status:

- ▶ **Target BCS at calving:**
3.0-3.25 (on a 5-point scale).
- ▶ **Over conditioned / Fat cows (>3.5 BCS):**
reduced DMI prepartum, greater fat mobilization, lower circulating glucose, and higher NEFA and BHB postpartum.
- ▶ **Under conditioned / Thin cows (<2.75 BCS):**
poor energy reserves, but often better glucose stability – yet they risk fertility delays.

BCS and blood glucose correlate indirectly - cows with **excess BCS** tend to have **lower glucose** during transition and greater insulin resistance. This predisposes them to **ketosis and fatty liver**.

Key takeaway:

BCS management pre-calving is the first step in stabilizing glucose and preventing metabolic disorders.

Measuring Glucose in Dairy Cow – Accuracy Really Matters

Why Human Glucometers Mislead?

Human devices are designed for whole blood, lower hematocrit variability, and human plasma glucose calibration. Cows have:

- ▶ Higher hematocrit and packed cell volume variation.
- ▶ Different plasma-to-whole blood glucose ratios.
- ▶ Lower normal glucose (40-70 mg/dL vs humans 70-110 mg/dL).
- ▶ Variable temperatures in field use.

Human meters often **underestimate glucose by 25-30%** or show inconsistent readings in cows, leading to misinterpretation and poor decisions.



Global Brand to Manage DCAD during Humid season

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Make Your Cattle Comfortable this season



- ↓ Less Panting
- ↓ Less Milk Loss
- ↓ Less Milk Fat Depression
- ↓ Less Repeater after AI

- + 5% increase water intake
- + 5% Milk Fat increase
- + 2kg DMI increase

FRENCH QUALITY

Kactus combines a series of ingredients which supplies essential Electrolytes, Glucogenic precursors and Natural Hepatic Protectant

Market Leader for Glucose Metabolism during Transition

Glycoline

— The Solution #1 for Hypoglycemia —



Since 25 Years - The Winning Combination
Proven Trials in more than 30 countries



- ↑ Blood Glucose 5mg/dl
- ↓ Blood BHBa 0.4mmol/dl
- ↑ Immunity Post Calving
- ↑ Better Conception

- + 2kg Dry matter intake
- + 5% Milk Production
- + 7 times ROI

PALATABILITY APPROVED

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Enhance Life Bonds



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Veterinary-Grade Devices: The Abbott device Example



For cows, use meters validated for **ruminant blood**.

Example: Abbott meters - used widely in bovine practice.

- ▶ **Calibrated for bovine blood**, compensates for hematocrit variability.
- ▶ Can measure **both glucose and BHB** accurately.
- ▶ Fast field results with sample size <1 µL.
- ▶ Operates reliably across ambient farm temperatures.

Practical tip:

If you're monitoring transition cows, use **Abbott meters** or other validated veterinary glucometers, not human diabetic meters.

Managing Low Glucose - Why Starch & Sugars Are Not the Fix

When glucose is low pre- or post-calving, the intuitive reaction is to feed more starch or sugars (molasses, jaggery, dextrose). But this approach is risky and mostly ineffective.

1 Rumen physiology mismatch

- ▶ Starch ferments rapidly → lactic acid & volatile fatty acids (VFAs) surge → lower rumen pH.
- ▶ Sudden starch increases during transition = subacute ruminal acidosis (SARA) risk.

2 Pro-inflammatory cascade:

- ▶ Acidotic rumen epithelium releases endotoxins (LPS), increasing systemic inflammation.
- ▶ Inflammation worsens insulin resistance → further glucose depression.

3 Short-lived effect:

- ▶ Rapid starch breakdown doesn't translate into a stable glucose pool; most goes to propionate in the rumen and is only partly converted to glucose by the liver.

Key message:

Do not "chase glucose" by adding raw sugars or starch. It destabilizes rumen health and can trigger **laminitis, metritis, displaced abomasum**.

The Smarter Path - Gluconeogenic Precursors

The liver is the cow's glucose factory.

To support it safely, we supply **gluconeogenic precursors** - compounds that bypass rumen fermentation or produce glucose precursors without acid overload.

Main Precursors & Why Combine Them

Precursor	Mode of Action	Practical Use
Mono Propylene Glycol (MPG)	Rapidly converted to propionate in rumen, then glucose in liver	Oral drench or feed inclusion pre- and post-calving
Glycerol	Moderately fermented to propionate; energy dense, safe	Mix in transition diet or top dress
Propionic Acid	Direct propionate source; quick hepatic glucose	Blend with glycerol/MPG for faster energy
Sorbitol	Slow release glucose precursor, osmotic support	Often combined with MPG/glycerol in drenches

Why combine 3-4 sources

Different fermentation rates = steady glucose release

Reduces risk of rumen upset compared to pure propylene glycol

Improves palatability and cow compliance

Check the products available in the market which as all 4 precursors plus Niacin and Cobalt



Innovation is in our DNA

GutAid™

Nourish the Gut

- ↓ Leaky Gut
- ↓ Heat Stress
- ↓ Transition stress
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BioRum™

Blend of additives with Slow release buffering action in Rumen

- ↑ Fibre digestion
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- Proteolytic action on wound
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- Tissue regeneration factors
- Assists in alveoli rejuvenation during dry period



Enhance Life Bonds



Practical Monitoring Strategy

1 Start with BCS screening

at dry-off and close-up pen;
correct over-conditioned cows early.

2 Blood checks

- ▶ Use Abbott meters or similar validated vet meters.
- ▶ Measure glucose and BHB 7-10 days before calving and first 7-10 days post-calving in sample cows.

3 Glucose targets

- ▶ ~2.5-3.5 mmol/L (45-63 mg/dL) close-up;
BHB <1.2 mmol/L postpartum.

4 Diet

- ▶ Maintain balanced energy: fiber ratio.
- ▶ Avoid overfeeding starch/sugar; ensure effective fiber and DCAD balance.

5 Supplements

- ▶ Use propylene glycol, glycerol, propionic acid, sorbitol blends for cows with low glucose or rising BHB.
- ▶ Feed high-quality transition mineral packs.

Message for the Industry

Stop using human diabetic meters for cows - inaccurate and misleading.

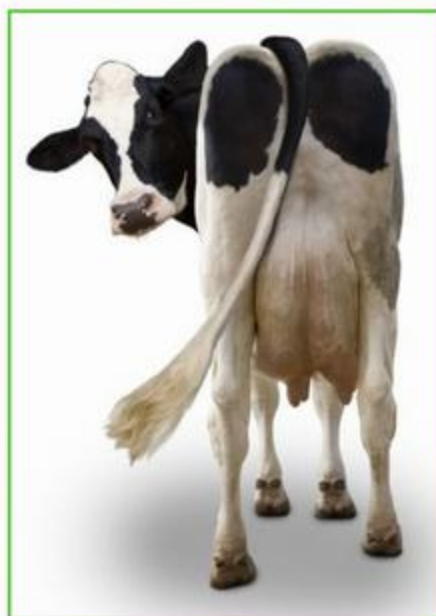
Stop advertising "high-glucose feeds" - no feed directly "raises glucose" safely.

Focus on liver support & gluconeogenesis, not dumping starch or sugar.

Encourage **veterinary-validated glucose & BHB monitoring** to detect at-risk cows early.

Conclusion

Glucose management in the close-up cow is about **precision and physiology**, not shortcuts. Proper **BCS control, validated glucose/BHB monitoring, and strategic use of gluconeogenic precursors** can dramatically reduce ketosis and transition cow problems. The **Abbott meter** is a reliable on-farm tool for this. Avoid the false comfort of human meters or "high sugar feeds" - they do not solve the underlying metabolic challenge.



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fibre digestion to unleash the
full potential of your ration

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Powering Dairy Progress: SEC Community Comes Together

An advanced in-person training program by the SEC India

Dairy Training Program
16-17 September 2025 | Pune, India



SEC Equipping the Next Generation of Dairy Managers in India

FROM THE SEC CENTER LEAD'S DESK
DR. P. E. VIJAY ANAND (SEC/USSEC)



As India's dairy sector continues to modernize and expand, the need for well-trained, forward-thinking professionals has never been greater. The Soy Excellence Center (SEC) India, under its mission to strengthen capacities across the protein value chain, is playing a pivotal role in developing the next generation of dairy managers equipped to meet these emerging challenges.

In 2025, SEC India successfully conducted two free, online training programs for dairy professionals across the country. These six-week courses were originally designed by John Bonnier and his team of Dutch dairy experts, whose extensive experience across global and Asian markets shaped a curriculum that blends international best practices with regional insights. The programs provided participants with a robust foundation in dairy management, encompassing both theoretical understanding and practical application.

Graduates of these courses have since joined the growing SEC Dairy Community, a network of young professionals committed to driving innovation and excellence in India's dairy sector. Building on this strong base, SEC India took a significant step forward by organizing its first advanced, in-person dairy training program in Pune on 16-17 September 2025. The event brought together 35 promising dairy professionals from across the SEC community for two days of immersive learning and collaboration.





The advanced training featured sessions led by four eminent industry experts –

- **Dr. Channegowda**, Consultant, Veterinary Nutrition
- **Dr. Pradeep Mahajan**, Consulting Animal Nutritionist
- **Dr. B.N. Suresh**, Professor of Animal Nutrition, Veterinary College, Bangalore
- **Mr. Dinesh Kumar**, Assistant General Manager, Dairy Tales Namdhari

Together, these experts developed and delivered **eight practical modules** specifically tailored to the Indian dairy context, covering critical areas such as:

1. Housing and management of dairy cows
2. Lactation and gestation physiology, body condition scoring, and reproductive efficiency
3. Replacement stock management
4. Feeding strategies for optimal production
5. Milking processes and hygiene
6. Diet formulation for dairy cows
7. Common cattle diseases and preventive measures
8. Management of metabolic disorders in high-producing cows

What truly set this program apart was its interactive format. The sessions encouraged dynamic discussions,

case-based learning, and peer-to-peer exchange. The four trainers collaborated as a panel of experts, jointly addressing participants' real-world challenges and offering actionable solutions drawn from both scientific knowledge and field experience.

Beyond technical training, the program also emphasized community building and professional networking. Through dedicated SEC engagement activities, participants were able to strengthen peer relationships and cultivate a sense of belonging within the growing SEC Dairy network.

The training concluded with an inspiring address by Dr. Dinesh Bhosale, Member of SEC's Regional Advisory Council, who underscored the immense opportunities in India's dairy industry and the critical role of skilled professionals in shaping its future. All participants received completion certificates, marking not just the end of the program, but the beginning of a more capable and confident generation of dairy managers.

With such initiatives, SEC India continues to reaffirm its commitment to empowering professionals, enhancing productivity, and fostering sustainable growth in the dairy sector as one of the most vital components of India's agri-economy.

What SEC Members Have to Say



Dr. Rahul Lanje

Assistant Manager - Nutritionist
Advanced Poultry Nutrition Lab, Pune
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Before joining the India SEC Dairy Course - Cohort #3, my goal was to strengthen my understanding of dairy nutrition and management practices so that I could apply them effectively in my professional role. This course helped me gain practical knowledge and confidence in approaching real-world challenges.

I am especially thankful to Mr. John Bonnier and Dr. Channegowda H. K. for their valuable guidance and teaching. Their insights, drawn from vast international and national experience, made the sessions very meaningful and directly applicable.

One moment that stood out to me was how the training connected global knowledge with practical solutions for the Indian context, making it highly relevant for professionals like me.

Overall, this program has had a positive impact on my professional growth. I feel more capable of contributing to my organization and supporting the farmers we serve.

I sincerely thank USSEC and Soy Excellence Centre for giving me this opportunity.

Management of Dairy Animals during summers

Mokshata Gupta¹ and Tanmay Mondal²

India, the world's leading milk producer, contributes approximately 26.67% to global milk output. This remarkable achievement stems from extensive dairy infrastructure, genetic improvement through crossbreeding, and improved feeding practices. However, climatic extremities, particularly summer heat stress, remain a formidable challenge in sustaining milk yield, quality, and animal health. In India, summer temperatures frequently exceed 45°C, far beyond the thermal comfort zone of 18-23°C for dairy cattle and buffaloes. Crossbred cows and high-producing buffaloes, due to their higher metabolic heat production, are especially vulnerable to heat stress.

The impact is both quantitative and qualitative. Milk production can decline by 10-30%, with significant reductions in fat, protein, and SNF content, particularly during early and mid-lactation phases. Moreover, nutritional imbalance during this period exacerbates metabolic disorders such as ruminal acidosis, ketosis, mineral deficiencies, etc.

To mitigate such adverse effects, nutritional management during summers becomes essential. Such nutritional approaches, when synchronized with housing and breeding interventions, offers a sustainable pathway to minimize climate-induced productivity losses in the Indian dairy sector.

Signs of Heat Stress in Dairy Ruminants

Heat stress in dairy ruminants leads to a cascade of physiological, metabolic, and behavioral changes. As the core body temperature rises beyond the thermoneutral

zone (18-23°C), adaptive responses are triggered to enhance heat dissipation, often at the cost of productivity and health. The clinical signs are as follows:

- Polypnea and open-mouth panting.
- Excessive salivation
- Seeking shade or cooler areas.
- Increased water intake with reduced feed intake
- Standing rather than lying
- Elevated rectal temperature
- Dry mucous membranes and tacky gums
- Sunken eyes and tachycardia
- Increased incidence of silent heat and anestrus

Effect of Heat Stress on Animal Production and Reproduction

Heat stress has emerged as a major limiting factor in dairy production systems, especially in tropical and subtropical regions like India.

1. Impact on Milk Production

Thermal stress significantly suppresses milk yield and quality in dairy animals.

- Early lactation cows experience a 14% decline in milk yield, while in mid-lactation, losses can reach 35%.
- In states like Punjab, Haryana, Rajasthan, and Uttar Pradesh, where summer temperatures often exceed 44°C, milk production drops by 15-20% in crossbred cows and 10-15% in buffaloes during May and June. These losses further increase to 20-25% in cows and 20% in buffaloes during the humid months of July and August.



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- Heat stress also alters milk composition, with marked reductions in milk fat, protein, casein, and solids-not-fat (SNF) content.

2. Impact on Reproduction

Heat stress negatively affects reproductive physiology and efficiency in dairy animals, with both male and female fertility being compromised.

- There is an increased incidence of anoestrus and silent heat.
- Altered luteinizing hormone (LH) and follicle-stimulating hormone (FSH) patterns, leading to delayed ovulation and poor estrus expression.
- Oocyte quality, fertilization rates, and early embryonic development are significantly affected. Sperm motility and viability also decrease under prolonged heat exposure.
- Exposure to elevated temperatures during gestation may result in intrauterine growth restriction, delayed placental development, and reduced birth weight of calves.

Overall, heat stress not only reduces conception and calving rates but also impairs long-term herd productivity by affecting the next generation of dairy animals.

Strategies to Mitigate the Harmful Effects of Heat Stress in Dairy Animals

Effective mitigation of heat stress in dairy animals requires an integrated approach combining breeding, housing, and nutritional management strategies.

1. Breeding Management: Heat stress adversely affects estrus behavior, conception rate, and semen quality, making breeding management crucial during summer.

- Reduced estrus expression under heat stress makes it difficult to detect optimal breeding time. Hence, timely heat detection protocols using activity monitors, tail chalking, or pedometers should be implemented.
- Artificial Insemination is preferred over natural mating during summer as both bulls and cows experience thermal infertility.
- Incorporating genetic selection for thermotolerance is a sustainable long-term strategy.
- Selection of animals with shorter, lighter-colored coats, loose skin, and larger sweat glands is practical for field-level farmers aiming to maintain herd productivity under rising temperatures.

2. Animal Housing Management: Proper housing design plays a key role in reducing the thermal load on dairy animals.

- Cooling systems, such as a combination of fans with water sprinklers, significantly lower the ambient temperature inside sheds.

- Buffaloes, due to their darker skin and fewer sweat glands, are more heat-sensitive and must be housed in well-ventilated sheds or provided with water pools or wallowing tanks.

- Animal shelters should be constructed along the east-west axis to minimize sun exposure. Roofs and walls should be painted white to reflect solar radiation.

- Avoid excessive sprinkling that may lead to wet bedding, predisposing animals to mastitis and hoof diseases.

- Use insulating roofing materials and install ridge ventilators to facilitate hot air escape.

- Planting trees around farm boundaries can lower the ambient temperature and improve animal comfort.

3. Nutritional Management: Nutrition plays a central role in alleviating the physiological burden of heat stress.

- Provide energy- and nutrient-dense diets to meet production demands.
- Provide Total Mixed Rations rich in bypass fats, bypass proteins, and low in fiber to reduce heat generation during digestion.
- Schedule feeding during cooler hours (early morning or late evening), and encourage night grazing if feasible.
- Supplement diets with antioxidants (Vitamin E, Vitamin C), trace minerals (Zn, Se, Cr), and immune boosters to counteract oxidative stress and maintain immune function.
- Use rumen fermentation stabilizers like live yeast cultures and ionophores to maintain rumen pH and enhance energy utilization.
- Ensure round-the-clock access to cool, clean drinking water.

Conclusion

To combat the rising threat of heat stress in dairy animals, a multi-dimensional management approach is necessary. This includes modifying housing conditions, optimizing feeding practices, promoting heat-resilient genetics, etc. Among these, nutritional interventions are the most immediate and controllable tool available to farmers for minimizing heat-induced losses. With the adoption of scientifically designed strategies, dairy farmers can safeguard herd health and productivity, even during the harshest summer months.

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Morphological traits and Management Practices of Bundelkhandi Goats

Swarup Debroy,¹ Uma Kant Verma^{2*}, Ram Bachan³,
Narendra Kumar⁴, Digvijay Singh⁵ and Shiv Kumar Tyagi²

Goats play a vital role in Indian agriculture, serving as a significant source of livelihood for rural communities, particularly in regions characterized by small holder and marginal farming systems. Both descript and non-descript breeds contribute substantially to the national economy and act as a form of socio-economic insurance for resource-poor farmers, especially in tropical and semi-arid areas. The Bundelkhandi goat, named after the Bundelkhand region of central India, is well-adapted to the local agro-climatic conditions and is primarily reared by small and marginal farmers for milk and meat. This breed is favored due to its low-input maintenance requirements, multipurpose utility, short generation interval, and high reproductive efficiency. It is well known for their resilience and productivity, these goats exhibit strong potential for enhanced growth and milk yield under improved feeding and management practices



Distribution of Bundelkhandi Goats:

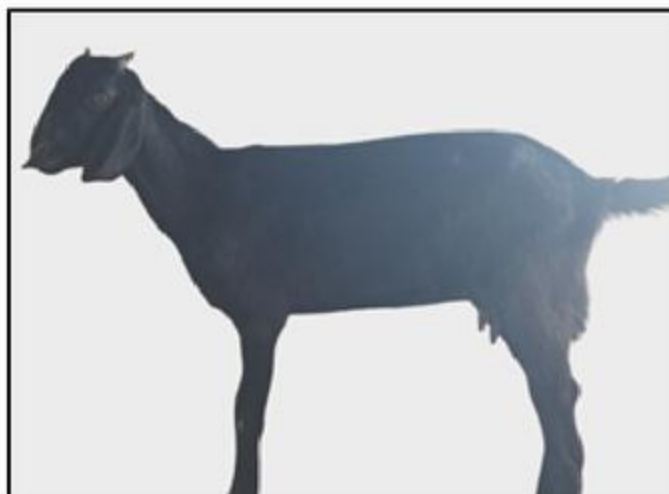
The genetically distinct and phenotypically stable strain of the Bundelkhandi goat is primarily localized in the Datia district of Madhya Pradesh and the Jhansi district of Uttar Pradesh, indicating a geographically constrained nucleus population within its native tract.

Morphological Characteristics of Bundelkhandi Goats

The Bundelkhandi goat, an indigenous breed primarily reared in the semi-arid zones of central India, is phenotypically categorized within the large-sized group, having morphological similarities to established Indian breeds such as Beetal, Jakhrana, and Jamunapari. Coat color is predominantly jet black, accompanied by pigmentation of the eyelids, muzzle, horns, and hooves in varying shades of black and grey. Ear morphology is predominantly medium-sized, tubular, and pendulous, with a mean ear length of 22-25 cm. However, elongated, ribbon-like, highly pendulous ears—resembling the

Jamunapari phenotype—are observed in a subset of the population, possibly reflecting introgression or shared ancestry. The limbs are long, straight, and robust, supporting the breed's adaptation to rugged terrain and long-distance grazing. Head is narrow in shape with a well-defined Roman nose, and the head-to-body proportion remains balanced. Horn orientation is typically upward and laterally divergent. The tail is characteristically bushy, and some individuals display long, coarse hair along the thighs and flanks, particularly in the winter season, which may confer thermoregulatory benefits.

Beard presence is recorded in both sexes, though variably expressed, and adult males often exhibit a prominent dewlap. The breed demonstrates a notable ability to withstand wide thermal fluctuations, surviving comfortably under ambient temperature ranging from sub-zero in winter to >45°C in peak summer, reflecting a high physiological adaptability and resilience under low input production system





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Productive and Reproductive Performance:

Bundelkhandi goats are primarily bred through natural mating, as artificial insemination (AI) is not practiced either on research farms or under field conditions. The typical buck-to-doe ratio maintained is approximately 1:10, with breeding males generally owned by large flock holders and often servicing goats across entire villages. Twinning is common in this breed, while the occurrence of triplets is rare. Farm records indicate average birth weights of 2.57 kg for male kids and 2.29 kg for females. The average age at first kidding ranges from 15 to 17 months, with an kidding interval of 215 to 240 days. Kids are allowed to suckle milk twice daily and are typically weaned at three months of age. The mean body weights at weaning are 12.2 kg for males and 10.8 kg for females. Bundelkhandi goats are valued for both meat and milk production. Under optimal nutritional and management conditions, peak daily milk yield can reach up to 2.8 liters, with lactation lengths extending up to 220 days.

Management of Bundelkhandi goats:

Goat rearing among medium-scale and progressive farmers in the Bundelkhand region is typically integrated with other agricultural enterprises, including cattle and buffalo husbandry and crop production. Flock sizes vary from a few animals to approximately 30 goats. These flocks are primarily composed of adult males and females, with a smaller proportion of growing kids. Farmers with smaller flocks often rely on contract grazing arrangements, while those managing larger flocks typically utilize their own grazing resources.

Bundelkhandi goats are predominantly managed under a semi-extensive system, relying largely on free-range grazing with minimal or no concentrate supplementation. Goats are taken to pasture in the morning and return after 7-8 hours of grazing. During the day, they forage on native grasses and tree loppings. Stall feeding is limited, with concentrates primarily offered to lactating or pregnant does. The goats diet mainly comprises straw residues from leguminous and cereal crops such as pigeon pea, chickpea, pea, sesame, sorghum, pearl millet and wheat. Fodder is also obtained from lopped branches of local tree species including *Ficus benghalensis* (bargad), *Ficus religiosa* (peepal), *Acacia nilotica* (babul), *Azadirachta indica* (neem), *Madhuca longifolia* (mahua) and *Albizia lebbek* (sirir) along with various shrubs and grasses.

Approximately 47% of goat keepers with medium to large flocks practice extensive grazing on common property resources. At night, goats are housed in temporary shelters—open structures in summer and enclosed spaces in winter. These shelters are typically constructed using wooden logs, bamboo, and thatched roofs, with limited or no permanent facilities for water and electricity. In some cases, a section of the farmer's residence is repurposed for goat housing. For very small flocks (fewer than five animals), goats are usually kept within the owner's home.

Health Status of Bundelkhandi goats:

The Bundelkhandi goat, exhibits robust adaptive traits and generally demonstrates good health under extensive and semi-intensive production systems. However, systematic documentation of its health status remains limited in the

scientific literature. Existing reports and field observations suggest that the breed shows relative resistance to common parasitic and infectious diseases endemic to the region, a likely result of long-term natural selection under harsh environmental and nutritional conditions. Preliminary surveys indicate that Bundelkhandi goats exhibit low incidence rates of major caprine diseases such as Peste des Petits Ruminants (PPR), Contagious Caprine Pleuropneumonia (CCPP), and Enterotoxemia, although outbreaks have been sporadically reported. In terms of parasitic infections, gastrointestinal nematodes, particularly *Haemonchus contortus*, are prevalent during the monsoon season, especially in poorly managed flocks. Nonetheless, field data from the region show comparatively lower fecal egg counts (FECs) in Bundelkhandi goats compared to exotic or crossbred counterparts reared under similar conditions, implying a level of innate parasitic tolerance. Neonatal mortality rates are relatively low, typically ranging between 5-10%, with primary causes including hypothermia, diarrhea, and inadequate colostrum intake in poorly managed herds. Emerging challenges include climate stress, particularly heatwaves and fodder scarcity, which indirectly affect immune competence and increase vulnerability to disease. There is also growing concern regarding antimicrobial resistance (AMR) due to unregulated antibiotic use in some pockets of semi-commercial farming.

Conclusion

In conclusion, the Bundelkhandi goat represents a valuable indigenous genetic resource, uniquely adapted to the challenging agro-climatic conditions of central India. Its distinct morphological features, robust physiological resilience, and efficient productive and reproductive traits make it well-suited for low-input, smallholder-based production systems. The breed's adaptability to extensive grazing, coupled with its capacity for moderate milk and meat yield, underscores its importance in supporting rural livelihoods in the Bundelkhand region. Despite the lack of formal breeding and health documentation systems, the Bundelkhandi goat demonstrates notable resistance to common diseases and parasites, a testament to its evolutionary adaptation. However, emerging threats such as climate variability, feed scarcity, and potential antimicrobial resistance call for systematic breed conservation efforts, targeted health monitoring, and improved management practices. Recognizing and preserving the Bundelkhandi goat is crucial not only for sustaining local biodiversity but also for enhancing the resilience and productivity of smallholder livestock systems in semi-arid India.

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When More Is Too Much: Mineral Overload in Dairy Cattle

Dr. A V Siva Reddy, MVSc.

Introduction

Mineral nutrition plays an essential role in maintaining health, productivity, and reproductive performance in dairy cattle. Macro-minerals (Ca, P, Mg, Na, Cl, K, S) and trace minerals (Cu, Zn, Mn, Se, Fe, I, Co) support majorly in bone development, enzyme & hormone function, immune health, reproduction and milk production.

While the prevention of mineral deficiencies has long been emphasized in dairy nutrition, the issue of over-supplementation, particularly with trace elements, has emerged as a significant challenge on intensively managed farms. This phenomenon is increasingly driven by unmonitored feeding practices, the use of high-bioavailability sources without dosage adjustment, and a "more-is-better" mentality.

Existing Practices Leading to Mineral Over-Supplementation

1. Layered Mineral Inclusion from Multiple Sources

Nowadays, the majority of dairy farms often incorporate minerals from several inputs: complete feeds, concentrates, free-choice minerals, oral preparations, water supplies, and bolus. Without proper coordination, these multiple sources can lead to cumulative intakes that far exceed requirements, particularly for trace minerals like Cu, Zn, and Se.

2. Use of Average Values Instead of Actual Feed Analysis

Depending on book values rather than laboratory testing of forages and TMR ingredients, results in an inaccurate estimation of baseline mineral supply. For example, legume forages may contain highly variable levels of calcium and magnesium depending on soil type and management.

3. Failure to Adjust for Bioavailability

The shift toward organic and chelated mineral sources has improved absorption and utilization under challenging conditions. However, these forms often have 1.5 to 3 times greater bioavailability compared to inorganic salts. When inclusion rates are not proportionally reduced, they can lead to accelerated tissue accumulation and toxicity.

4. Lack of Routine Monitoring

Over-supplementation is often subclinical and progressive. Regular liver biopsies or serum testing, mineral overload may go undetected until production losses or toxic responses occur.

Consequences of Mineral Over - Supplementation

1. Toxicity and Clinical Symptoms

Minerals such as copper, selenium, and iron have narrow safety margins. Over-supplementation leads to:

- Copper toxicity, particularly in Jersey cattle, characterized by liver necrosis and hemolytic crisis.
- Selenium toxicity, or selenosis, resulting in alopecia, lameness, and reduced feed intake.
- Iron overload, which may interfere with the absorption of copper and zinc, increasing susceptibility to oxidative stress and infection.

2. Antagonistic Interactions Between Minerals

Excessive intake of one mineral often disrupts the availability of others:

- High molybdenum and sulfur reduce copper absorption via formation of insoluble thiomolybdates in the rumen.
- Elevated calcium intake may impair phosphorus and magnesium utilization
- Excess intake of zinc can inhibit copper absorption at the intestinal level.

3. Reduced Performance and Fertility

Although clinical signs may not be apparent, chronic mineral excess is linked to:

- Reduced feed efficiency
- Lowered conception rates
- Altered immune response

4. Environmental Contamination

Excess minerals not absorbed by the cow are excreted in feces and urine, leading to:

- Accumulation of heavy metals like Cu, Zn, and Mn in agricultural soils.
- Eutrophication risks due to phosphorus and nitrogen loading.

5. Economic Losses

Unnecessary inclusion of expensive mineral supplements especially chelated or organic forms, without documented benefit, represents direct financial loss. It may also lead to indirect losses via reduced herd productivity or health.

Recommended Practices to Prevent Mineral Over-Supplementation

1. Accurate Forage and Water Testing

All feed should be analyzed regularly to account for existing mineral content. Special attention should be paid to water sources for minerals like sulfur, sodium, and iron, which can contribute significantly to total intake.

2. Use of Nutritional Models

Ration formulation should follow the latest ICAR or NASEM or CNCPS guidelines, considering:

- Actual dry matter intake

- Breed and physiological status
 - Interactions among nutrients
 - True bioavailability of supplemented minerals
- 3. Routine Monitoring of Animal Mineral Status**
- Liver biopsy remains the gold standard for assessing trace mineral stores (especially Cu, Se, Zn).
 - Blood testing can be used for monitoring circulating levels of selenium and magnesium
 - Manure analysis may provide insights into excreted mineral load and absorption efficiency.

4. Adjust Doses for High-Bioavailability Sources

Highly bioavailable mineral forms (e.g., copper proteinate, zinc methionine) should not be supplemented at the same levels as inorganic salts. Adjusted inclusion levels ensure that requirements are met without overloading tissues.

5. Adopt a Precision Nutrition Approach

- Incorporate targeted supplementation during the periods of increased need (transition, stress, disease recovery).
- Use high-bioavailability sources strategically to improve absorption and performance with lower inclusion rates.
- Take suggestions from a qualified nutritionist to fine-tune formulations based on performance feedback and lab results.

Conclusion

Over-supplementation of minerals in dairy cattle is an increasingly prevalent issue that stems from well-intentioned but poorly monitored practices. Left unchecked, it poses risks to animal health, herd productivity, environmental quality, and farm profitability.

Importantly, high bioavailability mineral sources are not the problem - they are a solution, provided they are used with precision and evidence-based formulation. When mineral inclusion levels are aligned with actual requirements and adjusted for source bioavailability, these advanced formulations can:

- Improve nutrient utilization
- Reduce excretion and environmental footprint
- Enhance immune and reproductive performance
- Offer greater return on nutritional investment

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Pashu Palan Mela

concluded with the message of taking better care of the next generation of dairy animals



The two-day 'Pashu Palan Mela' organized by Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana concluded today with the message of taking better care of the next generation of dairy animals. A large number of farmers registered their

participation in the fair and showed their interest in learning new techniques. On the second day, at the closing and prize distribution ceremony, Shri Rahul Bhandari, IAS, Financial Commissioner, Animal Husbandry, Dairy Development and Fisheries Department, Government of Punjab, was the chief guest.



Dr. Jatinder Paul Singh Gill, Vice Chancellor, Veterinary University, while presiding over the function and addressing the farmers, discussed the contribution made by the university and the feed companies for the flood affected people. He asked the farmers to become

readers of the university's books and monthly Magazine 'Vigyanak Pashu Palan'. He also informed that a modern feed testing laboratory is being set up at the university. Discussing the hospital services, he said that a new large animal hospital and an Equine hospital are being built at the university by next year. He discussed the research activities of the College of Fisheries and the new products being prepared by the College of Dairy and Food Science Technology. He also said that the university can also provide financial assistance of Rs. 10 lakhs for new entrepreneurs.

Dr. Ravinder Singh Grewal, Director of Extension Education said that some of our departments provide services related to animal husbandry while some departments train in preparing new products by adding value to the animal products. He said that good income can be earned by sitting at home with such work. He said that the speciality of these professions is that women can

also do them easily. He said that ornamental fish, aquariums for fish, flavored milk, lassi, paneer, meat and egg pickles, koftas, patties, Meat balls and various delicious dishes prepared from fish mince can be made. The University's College of Dairy and Food Science Technology, Department of Livestock Production prepared various types of meat and egg products, while the Fisheries College also displayed a large number of products. Dr. Grewal said that the animal husbandry farmers expressed their keen interest in improving the animal husbandry profession and adopting scientific techniques.



The experts of the University's Veterinary Hospital, who work for the health problems of animals, told the farmers that they can get any kind of clinical service. The university's publications 'Dairy Farming', 'Package of practices, monthly magazine and other publications were also the center of attraction for the farmers.

On this occasion, several booklets and publications prepared by the scientists of the university were launched by eminent personalities. These included booklet 'Khurak ate Chara Parkh Sevavan', 'Broiler Farming Guide', 'Goat Farming: Information Book for Entrepreneurs', 'Dairy Farm Planning', 'Folders prepared on various topics and the new issue of monthly magazine 'Vigyanak Pashu Palan' were released. 'Fortified Dairy Premix' as a dietary supplement for animals was also launched.



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DAIRY & AGRI EXPO 2026

07-08-09 FEBRUARY 2026

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450+
Exhibitors

4 Lakh+
Visitors

9,000+
Dealers

3,000+
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ਜੇ ਕਰਨਾ ਹੈ ਵਧਿਆ ਵਪਾਰ ਤਾਂ ਪਰਹੇਜ਼ ਕਰੋ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਦੇ ਮਿਲਾਪ

ਸਿੰਮਰਿਦਰ ਸਿੰਘ ਸੋਢੀ ਅਤੇ ਸ਼ਾਹਬਾਜ਼ ਸਿੰਘ ਢੀਂਡਸਾ

ਅਸੀਂ ਸਾਰੇ ਜਾਣਦੇ ਹਾਂ ਕਿ ਇਨਸਾਨਾਂ ਵਿੱਚ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਵਿਆਹ ਨਹੀਂ ਕੀਤੇ ਜਾਂਦੇ। ਇਸਦਾ ਇੱਕ ਤਕਨੀਕੀ ਕਾਰਣ ਇਹ ਹੈ ਕਿ ਸਾਡੇ ਜਿੰਨੇ ਵੀ ਵਾਂਸ਼ਿਕੀ ਗੁਣ ਹਨ ਉਹ ਸਾਰੇ ਕਿਸੇ ਨਾ ਕਿਸੇ ਜੀਨ ਰਾਹੀਂ ਕੰਟਰੋਲ ਕੀਤੇ ਜਾਂਦੇ ਹਨ ਅਤੇ ਹਰ ਇੱਕ ਗੁਣ ਦਾ ਪ੍ਰਗਟਾਵਾ ਦੋ ਜੀਨਾਂ ਦੇ ਸਬੰਧ ਨਾਲ ਹੁੰਦਾ ਹੈ। ਇਸ ਦੇ ਨਾਲ ਇਹ ਵੀ ਵਰਨਣਯੋਗ ਹੈ ਕਿ ਜੀਨ ਵੀ ਦੋ ਕਿਸਮਾਂ ਦੇ ਹੁੰਦੇ ਹਨ ਪ੍ਰਭਾਵਸ਼ੀਲ ਅਤੇ ਦਬਾਉ ਜੀਨ। ਪ੍ਰਭਾਵਸ਼ੀਲ ਜੀਨ ਤਾਂ ਹਰ ਹਾਲਤਾਂ ਵਿੱਚ ਆਪਣਾ ਅਸਰ ਦਿਖਾਉਂਦੇ ਹਨ ਪਰ ਜਦੋਂ ਦਬਾਉ ਜੀਨ ਕੰਟਰੋਲ ਹੋ ਜਾਂਦੇ ਹਨ ਸਿਰਫ਼ ਉਨ੍ਹਾਂ ਹਾਲਤਾਂ ਵਿੱਚ ਹੀ ਇਨ੍ਹਾਂ ਦਾ ਅਸਰ ਸਾਹਮਣੇ ਆਉਂਦਾ ਹੈ। ਕਿਸੇ ਵੀ ਗੁਣ ਦੇ ਪ੍ਰਗਟਾਵੇ ਲਈ ਮਾਪੇ ਇੱਕ-ਇੱਕ ਜੀਨ ਅਗਲਾਦ ਨੂੰ ਦਿੰਦੇ ਹਨ। ਇਸ ਤਰ੍ਹਾਂ, ਜੇਕਰ ਦੋਵਾਂ ਮਾਪਿਆਂ ਵੱਲੋਂ ਦਬਾਉ ਜੀਨ ਆ ਜਾਣ ਤਾਂ ਉਨ੍ਹਾਂ ਦੇ ਘਾਤਕ ਅਸਰ ਅਗਲਾਦ ਵਿੱਚ ਦੇਖਣ ਨੂੰ ਮਿਲਦੇ ਹਨ ਅਤੇ ਇਨ੍ਹਾਂ ਕਾਰਣ ਕਰਕੇ ਇਨਸਾਨਾਂ ਵਿੱਚ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਵਿਆਹ ਨਹੀਂ ਕੀਤੇ ਜਾਂਦੇ।

ਸੋ ਦਬਾਉ ਜੀਨਾਂ ਦੇ ਅਸਰ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖਦੇ ਹੋਏ ਅਸੀਂ ਜਾਨਵਰਾਂ ਵਿੱਚ ਵੀ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਮਿਲਾਪ ਤੋਂ ਵੀ ਪ੍ਰਹੇਜ਼ ਕਰਦੇ ਹਾਂ। ਅਸੀਂ ਪਹਿਲਾਂ ਵੀ ਕਈ ਵਾਰੀ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਹੋ ਰਹੇ ਮਿਲਾਪ ਰਾਹੀਂ ਸਾਹਮਣੇ ਆਉਣ ਵਾਲੀਆਂ ਅਗ਼ਕਤਾਂ ਤੇ ਵਿਚਾਰਵਾਨਾਂਦਰਾ ਵੀ ਕਰ ਚੁੱਕੇ ਹਾਂ। ਸਾਡੇ ਕਈ ਸਾਇੰਸਦਾਨਾਂ ਵੱਲੋਂ ਪਹਿਲਾਂ ਇਸ ਰਸਾਲੇ ਦੇ ਪਿਛਲੇ ਅੰਕਾਂ ਵਿੱਚ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਦੇ ਮਿਲਾਪ ਦੇ ਨੁਕਸਾਨ ਅਤੇ ਇਨ੍ਹਾਂ ਤੋਂ ਬਚਾਓ ਦੇ ਕਈ ਤਰੀਕਿਆਂ ਤੇ ਚਾਨਣ ਪਾਇਆ ਗਿਆ ਸੀ ਅਤੇ ਹੁਣ ਇਸ ਵਾਰੀ ਅਸੀਂ ਇੱਕ ਵਾਰ ਫਿਰ ਉਨ੍ਹਾਂ ਵਿਚਾਰਾਂ ਨੂੰ ਅੱਗੇ ਲਿਜਾਂਦੇ ਹੋਏ ਇਸ ਮੁੱਦੇ ਦੇ ਇੱਕ ਨਵੇਂ ਪਹਿਲੂ ਤੇ ਚਾਨਣ ਪਾਉਣ ਦੀ ਕੋਸ਼ਿਸ਼ ਕਰ ਰਹੇ ਹਾਂ ਤਾਂ ਜੋ ਅਸੀਂ ਆਪਣੇ ਡੋਅਰੀ ਦੇ ਧੰਦੇ ਨੂੰ ਹੋਰ ਲਾਹੇਵੰਦ ਬਣਾ ਸਕੀਏ ਅਤੇ ਆਪਣੇ ਵੱਗ ਵਿੱਚ ਵਧੇਰੇ ਪੈਦਾਵਾਰ ਵਾਲੇ ਕਟੜ/ਵਛੜ ਪੈਦਾ ਕਰ ਸਕੀਏ। ਜੇਕਰ ਵੇਖਿਆ ਜਾਵੇ ਤਾਂ ਇੱਕ ਨਸਲ ਦੇ ਜਾਨਵਰ ਕਿਤੇ ਨਾ ਕਿਤੇ ਤਾਂ ਇੱਕ ਦੂਜੇ ਨਾਲ ਰਿਸ਼ਤੇਦਾਰੀ ਦੇ ਤਗਰ ਤੇ ਜੁੜੇ ਹੁੰਦੇ ਹਨ ਪਰ ਅਸੀਂ ਉਨ੍ਹਾਂ ਜਾਨਵਰਾਂ ਨੂੰ ਰਿਸ਼ਤੇਦਾਰ ਗਿਣਦੇ ਹਾਂ ਜੋ ਆਪਣੇ ਵੱਗ ਵਿੱਚ ਦੂਜਿਆਂ ਦੇ ਮੁਕਾਬਲੇ ਜ਼ਿਆਦਾ ਸਾਂਝੇ ਜੀਨ ਰੱਖਦੇ ਹਨ ਜਾਂ ਫਿਰ ਪਿਛਲੀਆਂ 56 ਪੀੜੀਆਂ ਵਿੱਚ ਉਨ੍ਹਾਂ ਵਿੱਚ ਕਿਸੇ ਨਾ ਕਿਸੇ ਜਾਨਵਰ ਰਾਹੀਂ ਰਿਸ਼ਤੇਦਾਰੀ ਬਣਦੀ ਹੋਵੇ। ਸੋ ਕਹਿਣ ਦਾ ਭਾਵ ਇਹ ਹੈ ਕਿ ਉਹ ਜਾਨਵਰ ਜਿਨ੍ਹਾਂ ਵਿੱਚ ਸਾਂਝੇ ਜੀਨ ਦੂਜਿਆਂ ਦੇ ਮੁਕਾਬਲੇ ਜ਼ਿਆਦਾ ਹੁੰਦੇ ਹਨ ਉਨ੍ਹਾਂ ਦੇ ਆਪਸ ਵਿੱਚ ਮਿਲਾਪ ਤੋਂ ਪ੍ਰਹੇਜ਼ ਕੀਤਾ ਜਾਂਦਾ ਹੈ ਕਿਉਂਕਿ ਇਸ ਨਾਲ ਉਨ੍ਹਾਂ ਦੀ ਅਗਲਾਦ ਵਿੱਚ ਪੈਦਾਵਾਰ, ਸਰੀਰਕ ਵਾਧੇ ਅਤੇ ਪ੍ਰਜਨਨ ਆਦਿ ਦੀਆਂ ਕਈ ਖਾਮੀਆਂ ਸਾਹਮਣੇ ਆਉਂਦੀਆਂ ਹਨ।

ਪਰ ਦੂਜੇ ਪਾਸੇ ਅੱਜ ਦੇ ਵਪਾਰਿਕ ਪੱਧਰ ਵਿੱਚ ਜਿਥੇ ਡੋਅਰੀ ਫਾਰਮਿੰਗ ਦਾ ਕੰਮ ਦਿਨ ਦੁਗਣੀ ਰਾਤ ਚਗ਼ਗਣੀ ਬੁਲੰਦੀ ਤੇ ਪਹੁੰਚ ਰਿਹਾ ਹੈ, ਉਥੇ ਨਾਲ ਹੀ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਮਿਲਾਪ ਦੀ ਮਾਤਰਾ ਬਹੁਤ ਜ਼ਿਆਦਾ ਵਧ ਰਹੀ ਹੈ ਅਤੇ ਜਿਸ ਕਾਰਣ ਕਈ ਚੰਗੇ ਜਾਨਵਰਾਂ ਦੀ ਅਗਲਾਦ ਵੀ ਦੁੱਧ ਦੀ ਪੈਦਾਵਾਰ ਵਿੱਚ ਬਹੁਤ ਘਾਟ ਵੇਖਣ ਨੂੰ ਮਿਲਦੀ ਹੈ। ਇਸ ਘਾਟ ਦਾ ਸਭ ਤੋਂ ਵੱਡਾ ਕਾਰਣ ਇਹ ਹੈ ਕਿ ਸਾਡੇ ਡੋਅਰੀ ਫਾਰਮਿੰਗ ਦੇ ਕਿੱਤੇ ਨਾਲ ਜੁੜੇ ਕਈ ਕਿਸਾਨ ਵੀਰ ਜਾਨਵਰਾਂ ਦੇ ਮਿਲਾਪ ਦਾ ਰਿਕਾਰਡ ਨਹੀਂ ਰੱਖਦੇ ਜਾਂ ਫਿਰ ਜੇ ਰੱਖਦੇ ਹਨ ਉਨ੍ਹਾਂ ਕੋਲ ਪੂਰਾ ਰਿਕਾਰਡ ਨਹੀਂ ਹੁੰਦਾ ਅਤੇ ਇਸ ਦੇ ਸਦਕੇ ਨਤੀਜਾ ਇਹ ਹੁੰਦਾ ਹੈ ਕਿ ਕਈ ਪਿਉਧੀ ਦਾ, ਚਾਚੇ ਭਤੀਜੀ ਦਾ ਜਾਂ ਮਾਂਪੁੱਤ ਦਾ ਵਾਰੀਵਾਰੀ ਮਿਲਾਪ ਹੋ ਜਾਂਦਾ ਹੈ, ਜਿਸ ਕਾਰਣ ਕਈ ਦਬਾਉ ਜੀਨ ਕੰਟਰੋਲ ਹੋ ਜਾਂਦੇ ਹਨ ਅਤੇ ਉਨ੍ਹਾਂ ਸਦਕਾ ਸਾਨੂੰ ਨੁਕਸਾਨ ਦਾ ਸਾਹਮਣਾ ਕਰਨਾ ਪੈਂਦਾ।

ਪਰ ਅਸੀਂ ਇੱਥੇ ਇਹ ਕਹਿਣਾ ਜ਼ਰੂਰੀ ਸਮਝਦੇ ਹਾਂ ਕਿ ਸਹੀ ਰਿਕਾਰਡ ਨਾ ਰੱਖਣ ਵਿੱਚ ਸਾਰੇ ਦਾ ਸਾਰਾ ਕਸੂਰ ਸਾਡੇ ਕਿਸਾਨ ਵੀਰਾਂ ਦਾ ਨਹੀਂ ਹੁੰਦਾ ਭਾਵ ਕੋਈ ਵੀ ਆਦਮੀ ਜਾਣਬੂਝ ਕੇ ਆਪਣਾ ਨੁਕਸਾਨ ਨਹੀਂ ਕਰਾਉਣਾ ਚਾਹੁੰਦਾ, ਪਰ ਕਈ ਵਾਰੀ, ਰਿਕਾਰਡ ਹੀ ਇਹਨਾ ਜ਼ਿਆਦਾ ਹੋ ਜਾਂਦਾ ਹੈ ਜਾਂ ਰਿਕਾਰਡ ਇਤਨਾ ਪੁਰਾਣਾ ਹੋ ਜਾਂਦਾ ਹੈ ਕਿ ਉਸ ਨੂੰ ਸੰਭਾਲਣਾ ਬਹੁਤ ਮੁਸ਼ਕਿਲ ਹੋ ਜਾਂਦਾ ਹੈ। ਇਸ ਲਈ ਇਨ੍ਹਾਂ ਸਾਰੀਆਂ ਅਗ਼ਕਤਾਂ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖਦੇ ਹੋਏ ਅਤੇ ਸਾਇੰਸ ਦੀਆਂ ਨਵੀਆਂ ਖੋਜਾਂ ਸਦਕਾ ਸਾਡੇ ਕੋਲ ਸਾਇੰਸ ਦੀ ਇੱਕ ਦੇਣ ਕੰਪਿਊਟਰ ਹੈ ਜੋ ਕਿ ਰਿਸ਼ਤੇਦਾਰੀਆਂ ਵਿੱਚ ਹੋ ਰਹੇ ਮਿਲਾਪ ਰਾਹੀਂ ਆ ਰਹੀਆਂ ਅਗ਼ਕਤਾਂ ਤੋਂ ਸਾਨੂੰ ਬਚਾਅ ਸਕਦਾ ਹੈ। ਕਹਿਣ ਦਾ ਭਾਵ ਇਹ ਹੈ ਕਿ ਅੱਜ ਕਲ ਕੰਪਿਊਟਰ ਵਿਗਿਆਨੀਆਂ ਨੇ ਅਜਿਹੇ ਪ੍ਰੋਗਰਾਮ ਤਿਆਰ ਕੀਤੇ ਹਨ ਜਿਨ੍ਹਾਂ ਦੀ ਮੱਦਦ ਨਾਲ ਡੋਅਰੀ ਦਾ ਰਿਕਾਰਡ ਰੱਖਣਾ ਬਹੁਤ ਅਸਾਨ ਹੋ ਗਿਆ ਹੈ ਅਤੇ ਸਹੀ ਰਿਕਾਰਡ ਰੱਖਣ ਵਿੱਚ ਬਹੁਤ ਮੱਦਦ ਮਿਲੀ ਹੈ। ਕੰਪਿਊਟਰ ਦੀ ਮੱਦਦ ਨਾਲ ਅਸੀਂ ਆਪਣੇ ਡੋਅਰੀ ਦੇ ਧੰਦੇ ਦੇ ਵੰਸ਼ ਵਾਧੇ ਦਾ ਸਹੀ ਰਿਕਾਰਡ ਰੱਖ ਸਕਦੇ ਹਾਂ। ਇਸ ਵਿਧੀ ਰਾਹੀਂ ਸਾਨੂੰ/ਝੋਟੇ ਦਾ ਨੰਬਰ, ਵੀਰਯ ਵਾਲੇ ਟੀਕੇ ਦਾ ਨੰਬਰ, ਮਸਨੂਈ ਗਰਭਦਾਨ ਦੀ ਤਾਰੀਖ਼, ਗੱਭਣ ਚੈਕ ਕਰਨ ਦੀ ਤਾਰੀਖ਼, ਸਾਨੂੰ/ਝੋਟੇ ਦਾ ਦੁੱਧ ਦਾ ਰਿਕਾਰਡ, ਉਸ ਦੀ ਮਾਂ ਦੇ ਦੁੱਧ ਦਾ ਰਿਕਾਰਡ, ਸਾਨੂੰ/ਝੋਟੇ ਦੀਆਂ ਧੀਆਂ ਦਾ ਰਿਕਾਰਡ ਆਦਿ ਬਾਕੀ ਹੋਰ ਵੀ ਕਈ ਰਿਕਾਰਡ ਬੜੀ ਹੀ ਅਸਾਨੀ ਨਾਲ ਰੱਖੇ ਜਾ ਸਕਦੇ ਹਨ ਅਤੇ ਇਸ ਤਰ੍ਹਾਂ ਸੰਭਾਲੇ ਹੋਏ ਰਿਕਾਰਡ ਗੁਆਚਣ ਅਤੇ ਖਰਾਬ ਹੋਣ ਤੋਂ ਵੀ ਬੜੀ ਹੀ ਅਸਾਨੀ ਨਾਲ ਬਚਾਏ ਜਾ ਸਕਦੇ ਹਨ। ਇਸ ਤਰ੍ਹਾਂ ਕੰਪਿਊਟਰ ਦੀ ਮੱਦਦ ਨਾਲ ਆਪਣੇ ਹੋਣ ਵਾਲੇ ਨੁਕਸਾਨ ਤੋਂ ਬਚ ਸਕਦੇ ਹਾਂ। ਅਸੀਂ ਆਪਣੇ ਕਿਸਾਨ ਵੀਰਾਂ ਨੂੰ ਇਹ ਗੁਜ਼ਾਰਿਸ਼ ਕਰਾਂਗੇ ਕਿ ਉਹ ਕੰਪਿਊਟਰ ਰਾਹੀਂ ਆਪਣੇ ਡੋਅਰੀ ਦੇ ਧੰਦੇ ਦਾ ਸਹੀ ਰਿਕਾਰਡ ਰੱਖਣ ਅਤੇ ਆਪਣੇ ਆਪ ਨੂੰ ਅਤੇ ਆਪਣੇ ਡੋਅਰੀ ਦੇ ਧੰਦੇ ਨੂੰ ਅਸਮਾਨ ਦੀਆਂ ਉਚਾਈਆਂ ਤੇ ਲੈ ਕੇ ਜਾਣ।



GADVASU signs MoU with Novus Animal Nutrition on Dairy Nutrition Project

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Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana signed a Memorandum of Understanding with Novus Animal Nutrition (India) Pvt. Ltd. for a collaborative project on the study into the effects of MFP® Feed Supplement on milk production and composition in dairy cows. MFP® Feed Supplement is a source of methionine that optimizes milk and protein yield and milk fat production.

The MoU was signed by Dr. P.S. Brar, Director of Research and Dr. Manish Kumar Singh, Regional Director (South Central Asia), Novus Animal Nutrition (India) Pvt. Ltd. in the presence of Dr. J.P.S. Gill, Vice Chancellor and Dr. Gnanasekar, Bhupinder Thakur, Vishal Verma from Novus.

Dr. J.P.S. Gill congratulated both the teams and stated that "Nutrition is crucial for dairy animals as it directly impacts milk yield, composition, and the cow's overall health and this MoU is an excellent example of industry-academia partnership to address practical challenges in animal nutrition through scientific innovation." Dr. Manish Kumar Singh stated that Novus is committed to provide innovative and sustainable animal nutrition and health technologies rooted in scientific research to help animals reach their full potential. This occasion was graced by Deans, Directors, scientists of the University and officials from Novus.

Dr. Jasmine Kaur, Principal Investigator, shared that this research aims to evaluate 2-hydroxy-4-(methylthio) butanoate (HMTBa molecule) in a lactating cow's diet. HMTBa is a methionine precursor and it is known to improve milk production, milk fat and protein yields, and reduce milk fat depression in dairy cows. Milk fat depression is a serious issue for dairy farmers in India, as reduced fat content in milk directly lowers the price they receive, decreasing their income and profitability.

The project will be spearheaded by the Department of Animal Nutrition and supported by Novus Animal Nutrition with funding of Rs.18.29 lakh, along with the provision of test material. Dr. J.S. Hundal, HoD, Animal Nutrition told that the Department of Animal Nutrition will take up this research project and has full competency and facilities for this type of research projects.





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Transforming Dairy Nutrition For Quality Milk Production & Better Health.

MONOVET™ 200

(Monensin Sodium 20%)
Reduces methane emission
Excellent Feed Additive For Ruminants

UBS 60™

Optimising Rumen Performance

PR NITROMAX™

Non Protein Precision Release Nitrogen For Ruminants

HOSTAZYM® DAIRY/ ULTRA

Enzyme Complex Exclusively For Dairy

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DIGEST FAST

Hydrolized lecithins:

- ✓ High energy value.
- ✓ Resistant to ruminal action.

Botanical extracts:

- ✓ No degradados en rumen.
- ✓ Important function over the liver.

Expected results:

- ✓ NEB correction.
- ✓ Liver health optimizer.



Organic Trace Minerals

GLYADD 4P

- HIGHER CHELATION STABILITY
- LOWER INTERACTION WITH INGREDIENTS
- BETTER BIO AVAILABILITY

— Zinc Glycinate

— Cobalt Carbonate

— Manganese Glycinate

— Copper Glycinate





- 1** MODULATES
BLOOD GLUCOSE
- 2** IMPROVES
START OF LACTATION
- 3** IMPROVES FERTILITY

Manages Glucose Metabolism, Fast.



20.0, Billion* (cfu/gm)

UNICEL AY

**FIGHTS
HEAT STRESS**
with natural coolants &
electrolytes.

Increases serum glucose
concentration.

Balances digestive
microbial population.

Produces beneficial
gases, acids and
metabolites.

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