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Pulse of Livestock Industry

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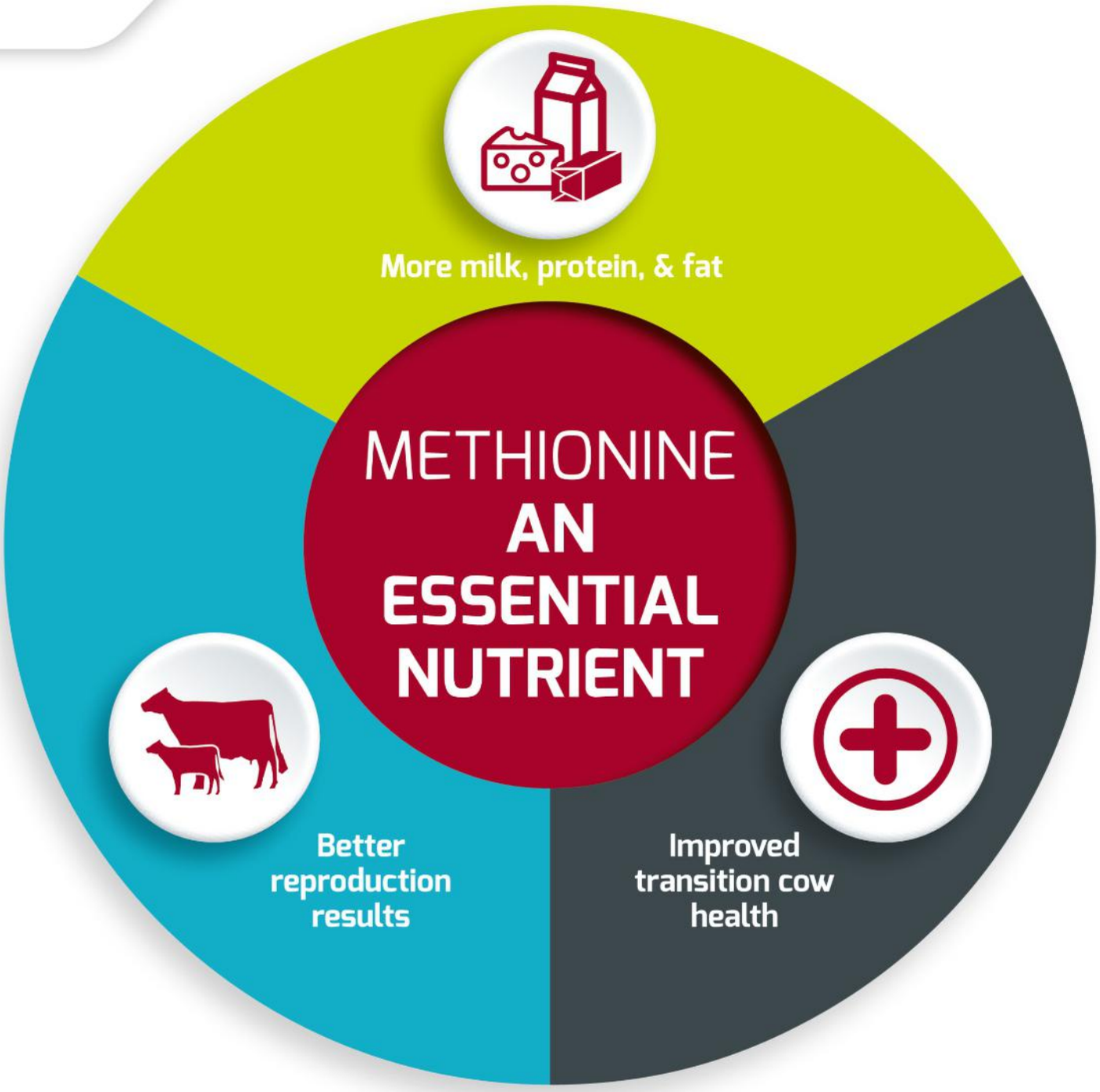

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From the Editor's Desk

GST Rationalization Boosts the Dairy Sector

India is the world's largest milk producer, with an output of 239 million tonnes in 2023-24, accounting for about 24% of global milk production. The dairy industry is not only a cornerstone of the agricultural economy but also plays a vital role in ensuring food security, enhancing rural livelihoods, and generating employment for millions. As the single largest agricultural commodity, dairy contributes 5.5% to the national economy. Milk and milk products make up the largest share of value in the livestock sub-sector, with the value of milk output reaching ₹12.21 lakh crores at current prices in 2023-24. The overall market size of the Indian dairy sector is estimated at ₹18.98 lakh crores in 2024. To strengthen India's dairy sector, the 56th GST Council, in its meeting held on 3rd September 2025, approved sweeping tax rationalizations on milk and milk products. These reforms mark one of the most comprehensive overhauls of GST rates in the sector, ensuring that most dairy products are now either exempt from tax or attract only a 5% rate.

Under the revised structure, effective from September 22, 2025, the following dairy items now enjoy lower or zero tax rates:

1. Ultra-High Temperature (UHT) Milk - GST reduced from 5% to Nil
2. Paneer / Chhena (Pre-packaged and labelled) - GST reduced from 5% to Nil
3. Butter, Ghee, and Dairy spreads - GST reduced from 12% to 5%
4. Cheese - GST reduced from 12% to 5%
5. Condensed Milk - GST reduced from 12% to 5%
6. Beverages containing Milk GST reduced from 12% to 5%
7. Ice Cream - GST reduced from 18% to 5%
8. Milk Cans - GST reduced from 12% to 5%

This significant tax rationalization is expected to boost the dairy sector and extend benefits to both farmers and consumers, thereby contributing to the country's overall socio-economic development. The reform will directly benefit over 8 crore rural farmer families, particularly small, marginal, and landless labourers engaged in rearing milch animals for their livelihoods, while also supporting a large segment of consumers. Lower taxation will help reduce operational costs, curb adulteration, and enhance the competitiveness of Indian dairy products in both domestic and export markets.

Amul has clarified that the price of its fresh pouch milk will remain unchanged even after the implementation of "GST 2.0" on September 22, 2025. The company states that this is because pouch milk has always been subject to zero percent GST, so there is no tax relief to be passed on in that segment. Only UHT (Ultra-High Temperature / long-life) milk will see a price benefit, as its GST rate is being reduced from 5% to nil under the new tax framework.

Uttar Pradesh's government has unveiled a bold, investor-friendly roadmap aimed at transforming the dairy industry. Currently producing 1,062 lakh litres per day—accounting for 16% of India's milk output—the state plans to triple production, create over 1 crore rural jobs, and emerge as a major global dairy exporter by 2047. Central to this strategy are significant GST reforms: UHT milk and packaged paneer are now GST-free, while butter, ghee, cheese, and ice cream enjoy reduced GST rates of 5% (from 12-18%)—making dairy more affordable and processing more profitable. The government is supporting this push with tax exemptions, grants, and streamlined investment facilitation. These efforts align with the wider "Viksit UP @2047" vision, aimed at transforming the state into a $1 trillion economy.

In recent trade discussions between India and the US, Washington has softened its demand to open the dairy trade, clarifying that it is primarily interested in exporting premium cheeses and not competing in India's mass-market milk or yogurt sector. US officials said that exporting bulk milk or yogurt doesn't make commercial sense due to logistical costs and regulatory challenges, but certain high-end cheese varieties could find a niche in India, potentially appealing to about 2-5% of consumers. India, however, remains cautious about any liberalization of its sensitive dairy sector.

India's smallholder dairy farms—responsible for the majority of the country's milk supply—are critical to reducing global dairy-related greenhouse gas emissions. However, their low productivity makes Indian dairy among the most carbon-intensive worldwide. The average milk yield per cow in India is just 1,700 kg per year, which is only 16% of North America's and 25% of Europe's yield. Producing one kilogram of fat-and-protein corrected milk in India generates approximately 1.73 kg CO_2e, compared to 0.74 kg in New Zealand and 0.96 kg in the U.S. —highlighting the efficiency gap. Experts say improving productivity is key. Currently, only 25% of livestock farmers receive production-related information, and just 14% benefit from public extension services—spending which makes up a mere 2% of India's livestock sector budget. Yet access to quality information alone could boost productivity by 15%, and combining multiple information sources could multiply gains more than fourfold. Education also plays a crucial role. Farmers with secondary education or higher consistently achieve significantly better milk yields. A promising initiative comes from Cornell University, which is developing a feed library of over 350 common ingredients used by smallholders. The goal is to help farmers craft balanced rations that minimize enteric methane emissions using available feeds.

Editor

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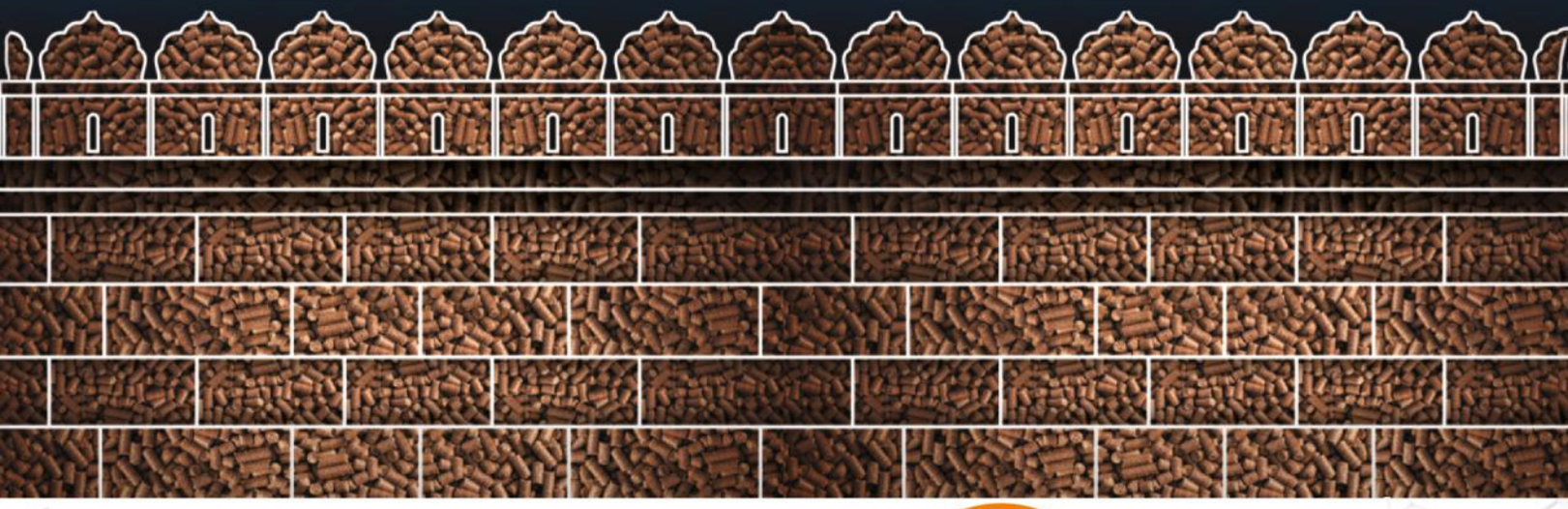

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ਗੁਰਪ੍ਰੀਤ ਸਿੰਘ[1], ਪ੍ਰਿਅੰਕਾ[1], ਅਰਪਿਤ ਕੌਰ[1]

ਅੱਜ ਦੇ ਆਧੁਨਿਕ ਯੁੱਗ ਵਿੱਚ, ਸਾਡੀ ਖੁਰਾਕ ਅਤੇ ਸਿਹਤ ਬਾਰੇ ਜਾਗਰੂਕਤਾ ਵਧ ਰਹੀ ਹੈ। ਇਸ ਦੇ ਨਾਲ ਹੀ, ਜੈਵਿਕ ਖੇਤੀ ਅਤੇ ਜੈਵਿਕ ਉਤਪਾਦਾਂ ਦੀ ਮੰਗ ਵਿੱਚ ਵੀ ਲਗਾਤਾਰ ਵਾਧਾ ਹੋ ਰਿਹਾ ਹੈ। ਪਰ ਅਕਸਰ ਇਹ ਸਵਾਲ ਉੱਠਦਾ ਹੈ ਕਿ ਜੈਵਿਕ ਉਤਪਾਦ ਅਸਲ ਵਿੱਚ ਕੀ ਹਨ ਅਤੇ ਉਹ ਸਾਡੇ ਲਈ ਕਿੰਨੇ ਮਹੱਤਵਪੂਰਨ ਹਨ? ਇਸ ਲੇਖ ਵਿੱਚ ਅਸੀਂ ਜੈਵਿਕ ਭੋਜਨ ਦੀ ਮਹੱਤਤਾ ਅਤੇ ਇਸ ਨਾਲ ਜੁੜੇ ਵੱਖ-ਵੱਖ ਪਹਿਲੂਆਂ ਬਾਰੇ ਚਰਚਾ ਕਰਾਂਗੇ।

ਜੈਵਿਕ ਉਤਪਾਦ ਕੀ ਹਨ?

ਜੈਵਿਕ ਉਤਪਾਦ ਉਹ ਖਾਣ-ਪੀਣ ਵਾਲੀਆਂ ਚੀਜ਼ਾਂ ਹਨ ਜੋ ਕੁਦਰਤੀ ਤਰੀਕਿਆਂ ਨਾਲ ਉਗਾਈਆਂ ਜਾਂ ਪ੍ਰੋਸੈਸ ਕੀਤੀਆਂ ਜਾਂਦੀਆਂ ਹਨ। ਇਨ੍ਹਾਂ ਨੂੰ ਤਿਆਰ ਕਰਨ ਲਈ ਕਿਸੇ ਵੀ ਤਰ੍ਹਾਂ ਦੇ ਰਸਾਇਣਕ ਖਾਦਾਂ, ਕੀਟਨਾਸ਼ਕਾਂ ਜਾਂ ਜੈਨੇਟਿਕ ਤੌਰ 'ਤੇ ਸੋਧੇ ਹੋਏ ਜੀਵਾਂ (ਘੌਸ) ਦੀ ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ। ਇਸ ਦੀ ਬਜਾਏ, ਜੈਵਿਕ ਖੇਤੀ ਵਿੱਚ ਵਾਤਾਵਰਣ-ਅਨੁਕੂਲ ਤਕਨੀਕਾਂ ਦੀ ਵਰਤੋਂ ਕੀਤੀ ਜਾਂਦੀ ਹੈ, ਜਿਵੇਂ ਕਿ:

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- **ਫ਼ਸਲ ਚੱਕਰ:** ਇੱਕ ਹੀ ਜ਼ਮੀਨ 'ਤੇ ਵੱਖ-ਵੱਖ ਸਮੇਂ 'ਤੇ ਵੱਖ-ਵੱਖ ਫ਼ਸਲਾਂ ਉਗਾਉਣਾ ਤਾਂ ਜੋ ਮਿੱਟੀ ਦੀ ਗੁਣਵੱਤਾ ਬਣੀ ਰਹੇ।

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4) **ਮਾਸ ਅਤੇ ਪੋਲਟਰੀ:** ਜੈਵਿਕ ਮੁਰਗੇ, ਅੰਡੇ, ਮੱਛੀ, ਜੋ ਕੁਦਰਤੀ ਵਾਤਾਵਰਣ ਵਿੱਚ ਪਾਲੇ ਜਾਂਦੇ ਹਨ। ਇਨ੍ਹਾਂ ਵਿੱਚ ਐਂਟੀਬਾਇਓਟਿਕਸ ਅਤੇ ਹਾਰਮੋਨਸ ਦੀ ਵਰਤੋਂ ਘੱਟ ਹੁੰਦੀ ਹੈ।

ਸਿਹਤ-ਲਾਭ

ਜੈਵਿਕ ਭੋਜਨ ਦੇ ਕਈ ਸਿਹਤ-ਲਾਭ ਹਨ ਜਿਨ੍ਹਾਂ ਬਾਰੇ ਵਿਗਿਆਨਕ ਅਧਿਐਨਾਂ ਨੇ ਵੀ ਪੁਸ਼ਟੀਕੀਤੀ ਹੈ:

1) **ਨੁਕਸਾਨਦੇਹ ਰਸਾਇਣਾਂ ਤੋਂ ਬਚਾਅ:** ਰਵਾਇਤੀ ਖੇਤੀ ਵਿੱਚ ਵਰਤੇ ਜਾਣ ਵਾਲੇ ਕੀਟਨਾਸ਼ਕ ਅਤੇ ਖਾਦਾਂ ਦੇ ਨੁਕਸਾਨਦੇਹ ਪ੍ਰਭਾਵਾਂ ਤੋਂ ਬਚਾਅ ਮਿਲਦਾ ਹੈ, ਜੋ ਕਿ ਕਈ ਬਿਮਾਰੀਆਂ ਦਾ ਕਾਰਨ ਬਣ ਸਕਦੇ ਹਨ।

2) **ਪੌਸ਼ਟਿਕ ਮੁੱਲ:** ਕੁਝ ਖੋਜਾਂ ਤੋਂ ਪਤਾ ਲੱਗਿਆ ਹੈ ਕਿ ਜੈਵਿਕ ਫਲ ਅਤੇ ਸਬਜ਼ੀਆਂ ਵਿੱਚ ਐਂਟੀਆਕਸੀਡੈਂਟ, ਵਿਟਾਮਿਨ ਅਤੇ ਖਣਿਜਾਂ ਦੀ ਮਾਤਰਾ ਵੱਧ ਹੋ ਸਕਦੀ ਹੈ, ਜੋ ਸਰੀਰ ਦੀ ਪ੍ਰਤੀਰੋਧਕ ਸ਼ਕਤੀ (ਮਿਊਨਿਟੇ) ਨੂੰ ਵਧਾਉਂਦੇ ਹਨ।

3) **ਦਿਲ ਦੀ ਸਿਹਤ:** ਜੈਵਿਕ ਦੁੱਧ ਅਤੇ ਮਾਸ ਵਿੱਚ ਓਮੇਗਾ-3 ਫੈਟੀ ਐਸਿਡ ਦੀ ਮਾਤਰਾ ਵੱਧ ਹੋ ਸਕਦੀ ਹੈ ਜੋ ਦਿਲ ਦੀ ਸਿਹਤ ਲਈ ਲਾਭਦਾਇਕ ਹੈ ਅਤੇ ਸੋਜ (ਨਡਲਓਮਮਓਟਿਨ) ਨੂੰ ਘੱਟ ਕਰਨ ਵਿੱਚ ਮਦਦ ਕਰਦਾ ਹੈ।

4) **ਐਲਰਜੀ ਅਤੇ ਅਸਥਮਾ ਦਾ ਘੱਟ ਜੋਖਮ:** ਕੁਝ ਅਧਿਐਨਾਂ ਅਨੁਸਾਰ ਜੈਵਿਕ ਭੋਜਨ ਖਾਣ ਵਾਲੇ ਬੱਚਿਆਂ ਵਿੱਚ ਐਲਰਜੀ ਅਤੇ ਅਸਥਮਾ ਦਾ ਜੋਖਮ ਘੱਟ ਹੋ ਸਕਦਾ ਹੈ। ਇਸ ਦਾ ਕਾਰਨ ਖੁਰਾਕ ਵਿੱਚ ਘੱਟ ਰਸਾਇਣਾਂ ਦੀ ਮੌਜੂਦਗੀ ਹੋ ਸਕਦਾ ਹੈ।

ਵਿਗਿਆਨਕ ਸਬੂਤ :

ਜੈਵਿਕ ਭੋਜਨ ਦੇ ਲਾਭਾਂ ਬਾਰੇ ਵਿਗਿਆਨਕ ਸਬੂਤ ਵੱਖ-ਵੱਖ ਅਧਿਐਨਾਂ ਤੋਂ ਮਿਲਦੇ ਹਨ। ਉਦਾਹਰਣ ਵਜੋਂ:

- **ਐਂਟੀਆਕਸੀਡੈਂਟਸ:** ਯੂਰੋਪੀਅਨ ਜਰਨਲ ਆਫ ਨਿਊਟ੍ਰੀਸ਼ਨ (European Journal of Nutiriton) ਵਿੱਚ ਛਪੇ ਇੱਕ ਅਧਿਐਨ ਅਨੁਸਾਰ, ਜੈਵਿਕ ਫਸਲਾਂ ਵਿੱਚ ਐਂਟੀਆਕਸੀਡੈਂਟਸ ਦੀ ਮਾਤਰਾ ਰਵਾਇਤੀ ਫਸਲਾਂ ਦੇ ਮੁਕਾਬਲੇ 18-69% ਵੱਧ ਸੀ।
- **ਕੀਟਨਾਸ਼ਕਾਂ ਦੇ ਅਵਸ਼ੇਸ਼:** ਅਮੈਰੀਕਨ ਅਕੈਡਮੀ ਆਫ ਪੀਡੀਆਟ੍ਰਿਕਸ (Ameircan Academy of Peidatircs) ਦੀ ਇੱਕ ਰਿਪੋਰਟ ਵਿੱਚ ਦੱਸਿਆ ਗਿਆ ਹੈ ਕਿ ਜੈਵਿਕ ਭੋਜਨ ਖਾਣ ਨਾਲ ਬੱਚਿਆਂ ਦੇ ਸਰੀਰ ਵਿੱਚ ਕੀਟਨਾਸ਼ਕਾਂ ਦੇ ਅਵਸ਼ੇਸ਼ਾਂ ਦੀ ਮਾਤਰਾ ਘੱਟ ਹੋ ਜਾਂਦੀ ਹੈ।
- **ਓਮੇਗਾ-3:** ਬ੍ਰਿਟਿਸ਼ ਜਰਨਲ ਆਫ ਨਿਊਟ੍ਰੀਸ਼ਨ (Biritsh Journal of Nutiriton) ਵਿੱਚ ਛਪੇ ਇੱਕ ਅਧਿਐਨ ਨੇ ਦਿਖਾਇਆ ਕਿ ਜੈਵਿਕ ਦੁੱਧ ਅਤੇ ਮਾਸ ਵਿੱਚ ਰਵਾਇਤੀ ਉਤਪਾਦਾਂ ਦੇ ਮੁਕਾਬਲੇ ਓਮੇਗਾ-3 ਫੈਟੀ ਐਸਿਡ ਅਤੇ ਜ਼ਰੂਰੀ ਖਣਿਜਾਂ ਦੀ ਮਾਤਰਾ ਵੱਧ ਹੁੰਦੀ ਹੈ।

ਨਿਸ਼ਕਰਸ਼ :

ਭੋਜਨ ਵਿੱਚ ਜੈਵਿਕ ਉਤਪਾਦਾਂ ਦੀ ਮਹੱਤਤਾ ਸਿਰਫ਼ ਸਿਹਤ ਤੱਕ ਸੀਮਿਤ ਨਹੀਂ ਹੈ, ਬਲਕਿ ਇਹ ਵਾਤਾਵਰਣ ਦੀ ਸੰਭਾਲ ਅਤੇ ਟਿਕਾਊ ਖੇਤੀ (ਸ਼ੁਸਟਓਿਨਓਬਲਏ ਓਗਰਿਚੁਲਟੁਰਏ) ਨੂੰ ਵੀ ਉਤਸ਼ਾਹਿਤ ਕਰਦੀ ਹੈ। ਹਾਲਾਂਕਿ ਜੈਵਿਕ ਉਤਪਾਦ ਰਵਾਇਤੀ ਉਤਪਾਦਾਂ ਦੇ ਮੁਕਾਬਲੇ ਥੋੜ੍ਹੇ ਮਹਿੰਗੇ ਹੋ ਸਕਦੇ ਹਨ, ਪਰ ਲੰਬੇ ਸਮੇਂ ਵਿੱਚ ਇਹ ਸਾਡੀ ਸਿਹਤ ਅਤੇ ਵਾਤਾਵਰਣ ਲਈ ਇੱਕ ਬਿਹਤਰ ਨਿਵੇਸ਼ ਸਾਬਤ ਹੁੰਦੇ ਹਨ। ਜੈਵਿਕ ਭੋਜਨ ਨੂੰ ਅਪਣਾਉਣਾ ਇੱਕ ਸਿਹਤਮੰਦ ਜੀਵਨ ਸ਼ੈਲੀ ਅਤੇ ਇੱਕ ਸਾਫ਼-ਸੁਥਰੇ ਵਾਤਾਵਰਣ ਵੱਲ ਇੱਕ ਮਹੱਤਵਪੂਰਨ ਕਦਮ ਹੈ।

ਗੁਰਪ੍ਰੀਤ ਸਿੰਘ[1], ਪ੍ਰਿਅੰਕਾ[1], ਅਰਪਿਤ ਕੌਰ[1]
[1]ਭੋਜਨ ਵਿਗਿਆਨ ਅਤੇ ਤਕਨਾਲੋਜੀ ਵਿਭਾਗ,
ਡੀਏਵੀ ਯੂਨੀਵਰਸਿਟੀ, ਜਲੰਧਰ, ਪੰਜਾਬ, 144012
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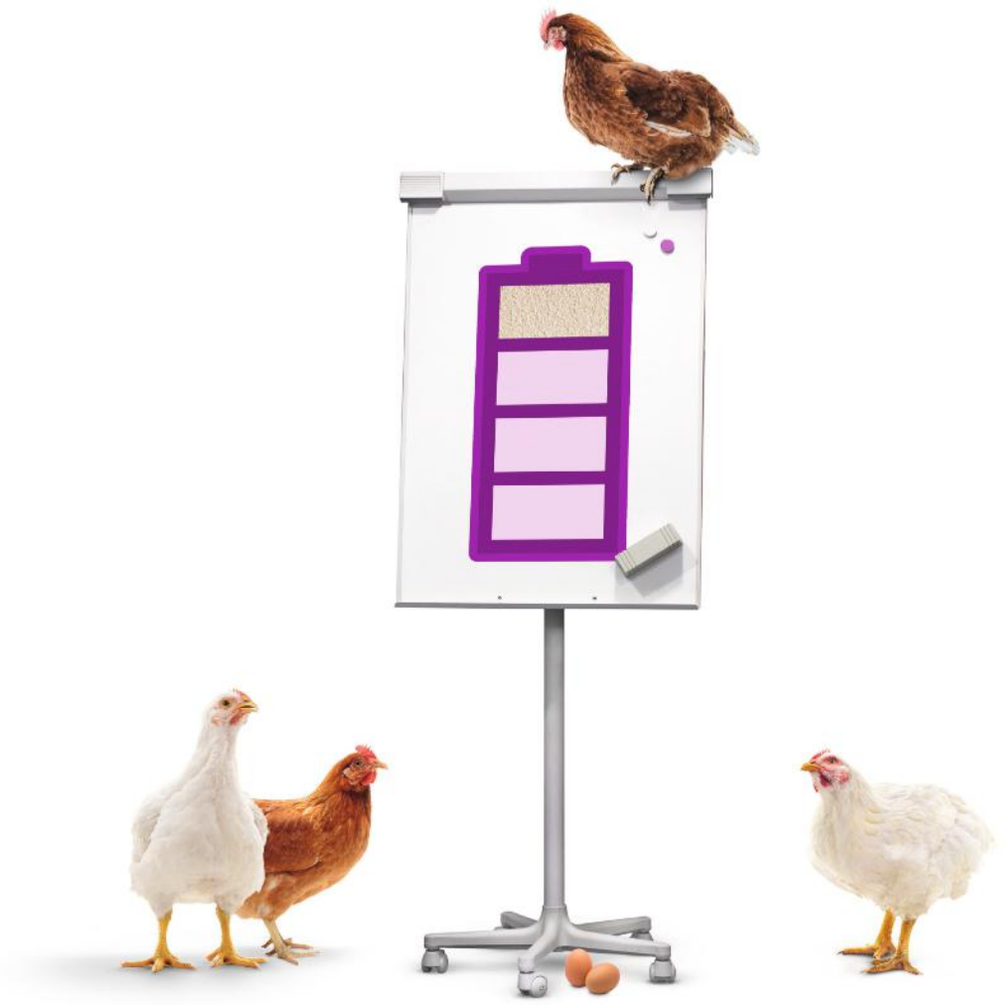

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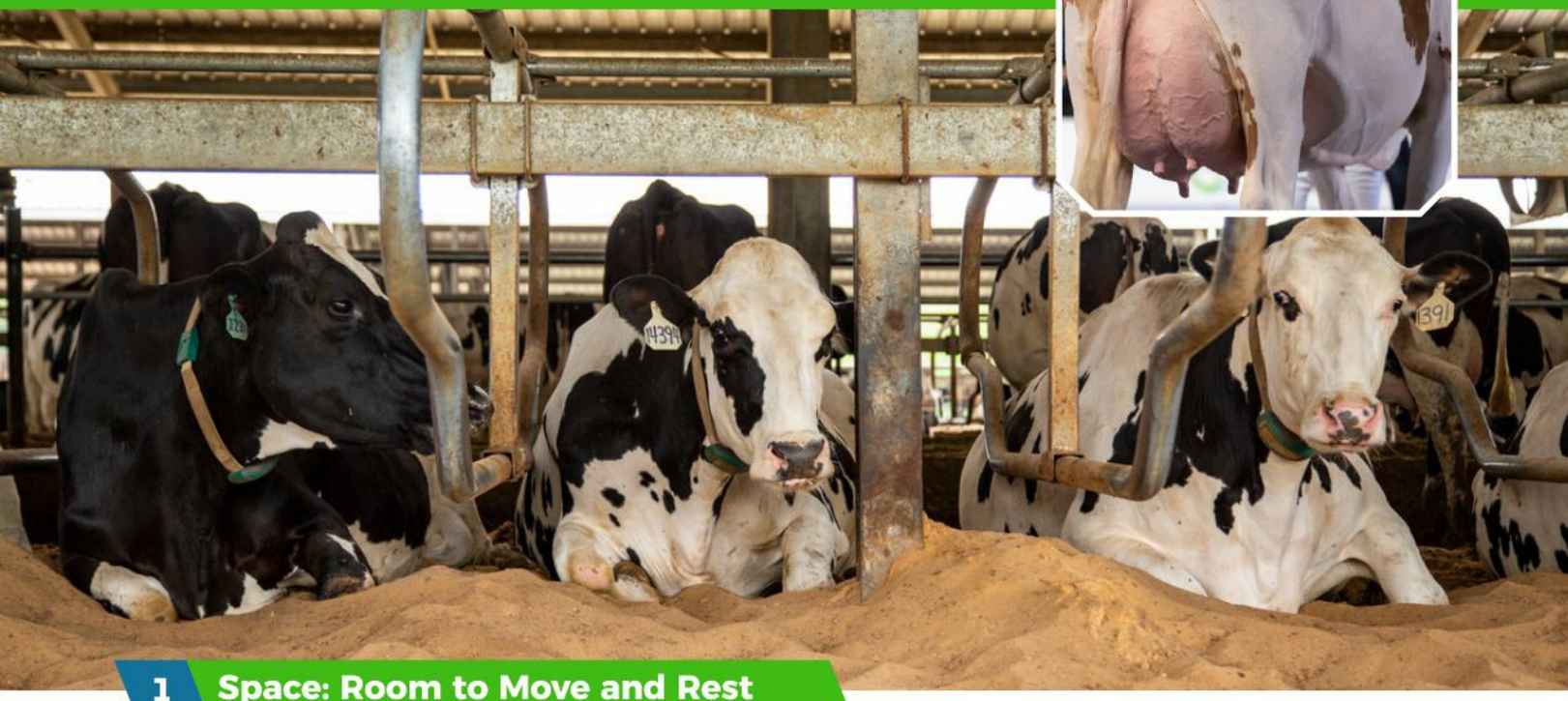
Dry Cow Comfort

Benefits for the Entire Lactation

The dry period is the foundation of every lactation. How a cow spends those crucial weeks before calving determines her health, milk yield, and fertility for months to come. Yet on many farms, dry cows are often given less attention than lactating cows. This is a costly mistake.

The message is simple : Comfort now = more milk later. By focusing on the six essentials of cow comfort—space, bedding, air, light, feed, and rest—farmers can transform transition success and profitability.



1 Space: Room to Move and Rest

Dry cows need generous lying and feeding space to stay relaxed and productive. A rule of thumb: every cow must be able to lie down at the same time, and timid cows should never be pushed away from feed or water.

- **Rest area:** 10–12 m² per dry cow in a bedded pack or loose housing.
- **Feed space:** 75–85 cm of bunk space per cow, so even the shy ones eat calmly.
- **Alleys:** Wide enough for easy passing - at least 4 m behind the feed line.

How can a Farmer check:
"Can every cow lie down at once, and can the smallest cow in the group reach the feed bunk without being pushed away?"

2 Bedding: Dry, Soft, and Deep

Cows spend 12–14 hours a day lying down. Bedding must therefore be dry to the knee, soft under the ribs, and topped up daily. Deep straw packs or well-managed sand beds are ideal. Comfort here equals more rest, better circulation, and healthier udders.

How can a Farmer check:
"If I kneel for 10 seconds, do my trousers stay dry? If not, the cow's udder won't either."

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- Heat Stress
- Transition stress
- Risk of Disease

BioRum™

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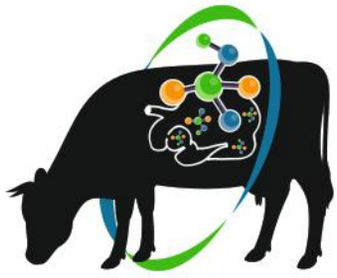

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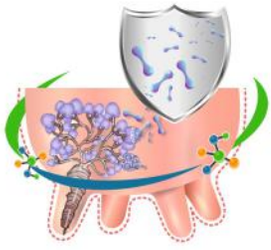

Enhance Life Bonds

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Email: feedback@biophiliahealthcare.com I Website: www.biophiliahealthcare.com

3 Air: Fresh and Cool Every Day

Good air removes moisture, heat, and gases. Fresh air is more than ventilation—it is disease prevention.

- **Avoid ammonia smells:** fresh air should smell like the open field.
- Over 22 °C, provide shade, fans, or sprinklers. Heat stress in dry cows leads directly to poor feed intake and weak fresh cows.

4 Light: Creating the Right Photoperiod for Dry Cows

Light is one of the most underestimated comfort factors in dairy farming. For dry cows, the right light environment is not a luxury—it is a powerful management tool that directly influences health, calving ease, immunity, and future milk production.

Why Light Matters for Dry Cows

Cows are seasonal animals by nature. Their hormones respond strongly to day length and light intensity. By managing light correctly during the dry period, farmers can influence:

- Immune function → stronger resistance to mastitis and metabolic problems.
- Hormone balance → better calving outcomes and fertility after calving.
- Feed intake and rest → calmer cows that are better prepared for transition.

The Right Light Levels

- Target light intensity for dry cows: Below 50 lux for most of the day.
- This is considered a "short-day photoperiod" or "artificial winter."
- Low light helps the cow's hormones reset, increases immune activity, and prepares the udder for maximum milk after calving.

How can a Farmer test:
If you can barely read a newspaper at cow eye level, the light is correct for dry cows.

Duration of Light and Darkness

- Dry cows should receive 8–12 hours of dim light and 12–16 hours of true darkness daily.
- The dark period is just as important as the light period. Even weak stray light at night (>50 lux) can disturb hormone reset.
- Use timers, curtains, or switches to keep dry cow barns darker than lactating cow areas.

Measuring Light on the Farm

- Lux meters are inexpensive tools for accuracy.
- Smartphone apps provide a quick estimate.
- Always measure at cow eye level, not at ceiling height.

How can a Farmer check:
"At night, can I still see my hand clearly from across the pen? If yes, it's too bright."

5 Feed & Water: Calm Access, Not Just Quantity

Transition cows don't just need enough feed—they need peaceful feed.

- Push feed up frequently, especially in the first hours after feeding.
- Provide multiple water troughs with 4 m of space around them so timid cows can drink without being bullied.
- Keep dry cow groups understocked, never more than 100% capacity.

6 Rest: The Foundation of Transition Success

The real goal is 12–14 hours of lying time. If cows are still standing two hours after feed delivery, comfort is limiting them.

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+ 5% Milk Fat increase
+ 2kg DMI increase

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Since 25 Years - The Winning Combination

Proven Trials in more than 30 countries

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- Immunity Post Calving
- Better Conception

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+ 5% Milk Production
+ 7 times ROI

FRENCH QUALITY

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7 Calving Without Stress: The Stress-Free Calving Line & Cuddle Box

The calving pen is where a lifetime of performance begins.

- **Stress-Free Calving Line:** Move cows into a large straw pen about 3 weeks before calving, and keep them there for 3 weeks after. This gives calm surroundings, good feed access, and hygiene. Each cow should have 8–12 m^2 of deep straw bedding.
- **Cuddle Box:** A small, clean space inside the calving area where the calf is placed right after birth. Here, the dam can lick and bond, while the farmer has easy access for colostrum feeding. This simple tool improves calf survival, reduces disease, and makes colostrum management stress-free.

Dry Cow Comfort Quick Score - A Quick Checklist

(Tick ✓ for YES, ✗ for NO)

- ☐ **Every cow can lie down at once**
- ☐ **Bedding is dry at the knee**
- ☐ **Air is fresh, no ammonia smell**
- ☐ **Dry cow barn light < 50 lux (dim)**
- ☐ **True darkness 12–16 h at night**
- ☐ **Calving pen ready with cuddle box**
- ☐ **Water troughs are clean and easy to reach**

Scoring guide:
7/7 ticks = Excellent – Your dry cows are ready for success.
5–6 ticks = Good – Fix 1–2 issues for better results.
≤ 4 ticks = Risky – Comfort is limiting the next lactation.

Comfort is an Investment, Not a Cost

Dry cow comfort is not about luxury. It is about return on investment. Comfortable cows calve easier, eat better, start stronger, and give more milk in the next lactation.

Every rupee spent on space, bedding, air, light, and transition feed gives back three to four rupees in milk and healthier cows. The message to every farmer is clear: "Take care of the dry cow today, and she will take care of your profits tomorrow."

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दुग्ध उत्पादों में खाद्य सुरक्षा, मिलावट नियंत्रण एवं अनुरेखण प्रणाली: एक समग्र दृष्टिकोण

डॉ. पवार ऋतिक नामदेव, डॉ. शिप्रा तिवारी

1. प्रस्तावना

दूध भारतीय जनजीवन का अभिन्न अंग है। यह न केवल पोषण का मुख्य स्रोत है बल्कि सांस्कृतिक एवं आर्थिक दृष्टि से भी अत्यंत महत्त्वपूर्ण है। आधुनिक काल में दुग्ध–उद्योग ने तीव्र प्रगति की है, परन्तु इसके साथ–साथ खाद्य सुरक्षा, मिलावट तथा गुणवत्ता की चुनौतियाँ भी सामने आई हैं। उपभोक्ता को शुद्ध एवं सुरक्षित दूध अथवा दुग्ध उत्पाद प्रदान करना वर्तमान समय की प्रथम आवश्यकता बन गई है। इसी परिप्रेक्ष्य में खाद्य सुरक्षा, मिलावट नियंत्रण एवं अनुरेखण प्रणाली (Traceability Systems) की चर्चा अत्यंत प्रासंगिक है।

2. खाद्य सुरक्षा (Food Safety) और इसका महत्त्व

खाद्य सुरक्षा का तात्पर्य है – ऐसा भोजन जो स्वास्थ्य के लिए सुरक्षित हो, हानिकारक रोगाणु, विषाणु, रसायन या अशुद्धियों से मुक्त हो।

- दूध शीघ्र खराब होने वाला पदार्थ है, अतः इसमें सूक्ष्मजीवों (जैसे ई.कोलाई, साल्मोनेला, लिस्टेरिया) की वृद्धि की सम्भावना अधिक रहती है।
- यदि उचित तापमान, स्वच्छता एवं भंडारण न किया जाए तो उपभोक्ता को खाद्य जनित रोगों का खतरा बढ़ सकता है।
- भारतीय खाद्य संरक्षा एवं मानक प्राधिकरण (FSSAI) ने दूध एवं दुग्ध उत्पादों की गुणवत्ता सुनिश्चित करने हेतु मानक निर्धारित किए हैं।

खाद्य सुरक्षा बनाए रखने के लिए–

1. दुग्ध दुहने से पूर्व पशुओं की स्वच्छता।
2. बर्तनों व उपकरणों की स्वच्छ धुलाई।
3. शीत शृंखला (ब्वसक बैंपद) का पालन।
4. प्रसंस्करण इकाइयों में स्वच्छ वातावरण।
5. पैकेजिंग एवं वितरण के दौरान गुणवत्ता जाँच।

3. मिलावट नियंत्रण (Adulteration Control)

मिलावट आज दुग्ध उद्योग के लिए सबसे बड़ी चुनौती है। दूध में पानी, यूरिया, डिटर्जेंट, स्टार्च, कृत्रिम वसा, सिंथेटिक रंग अथवा चीनी जैसी चीजें मिलाकर कृत्रिम रूप से मात्रा या गाढ़ापन बढ़ाने की प्रवृत्ति आम है।

(क) मिलावट के दुष्प्रभाव

- पानी मिलाने से पोषण घटता है और संक्रामक रोगों की सम्भावना बढ़ती है।
- यूरिया, डिटर्जेंट अथवा फॉर्मेलिन जैसी रसायनिक मिलावटें मानव स्वास्थ्य पर विषैले प्रभाव डालती हैं।
- बच्चों एवं गर्भवती महिलाओं के लिए यह और भी हानिकारक सिद्ध होता है।

(ख) मिलावट नियंत्रण हेतु उपाय

1. तेज परीक्षण उपकरण (Rapid Test Kits)– इनसे तुरंत जाँच कर मिलावट का पता लगाया जा सकता है।
2. प्रयोगशाला विश्लेषण– उच्च–दबाव द्रव–गुणसूत्रीकरण (HPLC), गैस–गुणसूत्रीकरण (GC&MS) जैसे उन्नत परीक्षण।
3. जनजागरूकता अभियान– उपभोक्ताओं को घर पर किए जाने वाले सरल परीक्षणों की जानकारी देना।
4. कानूनी प्रावधान– मिलावट करने वालों के विरुद्ध कठोर दंड एवं आर्थिक दायित्व।

4. अनुरेखण प्रणाली (Traceability Systems)

अनुरेखण का अर्थ है दृ उत्पादन से लेकर उपभोक्ता तक दुग्ध की प्रत्येक इकाई का लेखा–जोखा रखना। यह आधुनिक गुणवत्ता प्रबंधन का आधार है।

(क) अनुरेखण प्रणाली के लाभ

- किसी उत्पाद में समस्या आने पर उसके स्रोत का तुरंत पता लगाया जा सकता है।
- उपभोक्ता का विश्वास बढ़ता है।
- निर्यात के क्षेत्र में भारतीय दुग्ध उत्पादों की स्वीकृति बढ़ती है।

(ख) तकनीकी साधन

1. क्यूआर कोड और बारकोड प्रणाली– पैकेट पर छपने वाले इन कोड से उपभोक्ता स्रोत की जानकारी प्राप्त कर सकता है।
2. ब्लॉकचेन तकनीक– दूध की हर खेप का डिजिटल अभिलेख सुरक्षित रहता है, जिसे बदला नहीं जा सकता।
3. कृत्रिम बुद्धिमत्ता एवं सेंसर तकनीक– दुग्ध संग्रहण केंद्रों पर स्वचालित गुणवत्ता परीक्षण और अभिलेखन।

भविष्य की दिशा (Future Directions)

दुग्ध उत्पादों की गुणवत्ता, सुरक्षा और उपभोक्ता विश्वास को बनाए रखने हेतु आने वाले वर्षों में अनेक नवाचार एवं प्रौद्योगिकीय सुधार आवश्यक हैं।

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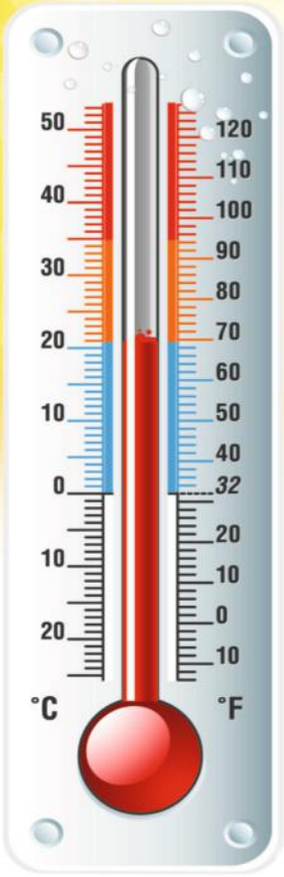

...LEVUCELL®SC maximizes milk production during heat stress

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€ EU approved for use in bovine destined for milk and meat production, dairy goats, dairy ewes and lambs (E1711/4a1711/4b1711). Not all products are available in all markets nor associated claims allowed in all regions.

Heat stress adversely impacts dairy cow performance

Did you know that heat stress can cost over 400€/cow/year[1]? The consequences of heat stress include significant losses in milk production, (which can be up to 35%), coupled with rumen dysfunction and reduced reproduction rates.

The level and impact of heat stress on cows is influenced by a combination of ambient temperature and relative humidity. New research has shown that temperatures in excess of 20°C and 50% relative humidity[2] will lead to cow discomfort and reduced milk production.

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

Even under conditions of heat stress, LEVUCELL®SC will maximize diet potential and your Income Over Feed Costs

- Milk yield: +1.2 to 2.5 litres/cow/day.
- Increased Feed efficiency : up to 7%*, +120g of milk/kg/Dry Matter Intake.
- Optimizes rumen pH (less risk of acidosis).

LEVUCELL®SC is a rumen specific live yeast *Saccharomyces cerevisiae* I-1077, selected through collaboration with INRA (France).

**Marfola, et al, ADSA 2010.*

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LALLEMAND

1. ब्लॉकचेन आधारित अनुरेखण (Traceability):

ब्लॉकचेन तकनीक से दुग्ध शृंखला के प्रत्येक चरणकृगाय के चारे से लेकर उपभोक्ता की थाली तककृकी जानकारी पारदर्शी रूप में सुरक्षित रखी जा सकती है। इससे मिलावट की संभावना घटेगी और उपभोक्ता को उत्पाद की पूर्ण यात्रा का विश्वास प्राप्त होगा।

2. स्मार्ट संवेदी यंत्र (Smart Sensors):

डेयरी संयंत्रों में **बायोसेंसर एवं कृत्रिम बुद्धिमत्ता (AI)** का प्रयोग कर वास्तविक समय में दूध की शुद्धता की जाँच करना संभव होगा। उदाहरणस्वरूप, वसा, प्रोटीन, एसएनएफ और अवांछित तत्वों की त्वरित जाँच खेत पर ही की जा सकेगी।

3. राष्ट्रीय स्तर पर मानकीकरण (Standardization):

भारत जैसे विशाल देश में एकीकृत **"राष्ट्रीय दुग्ध गुणवत्ता मानक"** की स्थापना समय की माँग है, जिससे किसी भी क्षेत्र से आने वाले उत्पादों की गुणवत्ता और सुरक्षा समान रूप से सुनिश्चित हो सके।

4. उपभोक्ता जागरूकता अभियान:

केवल प्रौद्योगिकी पर्याप्त नहीं है। **जनजागरूकता** ही मिलावट रोकथाम की आधारशिला है। विद्यालयों, ग्राम पंचायतों और शहरी उपभोक्ता समूहों को दुग्ध सुरक्षा से जोड़ना होगा।

5. हरित और सतत डेयरी (Green & Sustainable Dairy):

भविष्य का डेयरी क्षेत्र केवल शुद्धता तक सीमित नहीं रहेगा बल्कि वह **पर्यावरण–अनुकूल** भी होगा। जल, ऊर्जा एवं कार्बन पदचिह्न को घटाते हुए सतत डेयरी प्रणाली विकसित करनी होगी।

निष्कर्ष (Conclusion)

दुग्ध भारत की संस्कृति, पोषण और अर्थव्यवस्था की धुरी है। किंतु, **मिलावट और खाद्य असुरक्षा** जैसी चुनौतियाँ उपभोक्ता स्वास्थ्य और डेयरी उद्योग की विश्वसनीयता पर प्रश्नचिह्न खड़ा करती हैं।

आज आवश्यकता है कि–

- **खाद्य सुरक्षा मानकों का कठोर अनुपालन हो।**
- **अनुरेखण प्रणाली (Traceability Systems)** का व्यापक विस्तार किया जाए।
- **आधुनिक तकनीक और पारंपरिक नैतिकता** का संगम कर दूध को न केवल शुद्ध बल्कि "विश्वस्तरीय" बनाया जाए।
- सरकार, उद्योग, वैज्ञानिक और उपभोक्ता मिलकर **एक समेकित दुग्ध सुरक्षा तंत्र** विकसित करें।

यदि इन दिशा–निर्देशों पर ठोस कार्य हुआ तो भारत का दुग्ध क्षेत्र न केवल **देश की पोषण सुरक्षा** को सुनिश्चित करेगा बल्कि **वैश्विक स्तर पर "शुद्ध और सुरक्षित दुग्ध उत्पादों का अग्रणी आपूर्तिकर्ता"** भी बनेगा।

डॉ. पवार ऋतिक नामदेव, डॉ. शिप्रा तिवारी
(एम.वी.एस.सी. स्कॉलर), पशु उत्पाद प्रौद्योगिकी विभाग,
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PDFA Launches Haryana Chapter to Boost Dairy Development

In a significant move to strengthen dairy farmer support in the region, the Progressive Dairy Farmers Association (PDFA) has officially launched its Haryana chapter. The announcement was made by S. Dalbir Singh, the newly appointed PDFA Haryana President, during a media interaction. He highlighted that the chapter aims to follow the successful path laid by PDFA Punjab, focusing on farmer empowerment and dairy development.

The event was graced by S. Daljeet Singh, PDFA Punjab President, and his team, who promised relentless support to the Haryana chapter in its initiatives. The new chapter plans to organize monthly seminars, similar to PDFA Punjab, and conduct a PDFA Haryana Fair to facilitate farmer engagement. Additionally, they will work on importing and distributing quality semen to farmers, enhancing livestock productivity in the state.

On this occasion, PDFA Haryana also honoured their district presidents and appointed new block presidents, strengthening their leadership network at the grassroots level.

The establishment of PDFA Haryana marks a key step in expanding farmer-centric initiatives and knowledge sharing across northern India, promising new opportunities for dairy farmers in the region.


















ARTICLE

Buffaloes and Their Role in Strengthening Punjab's Dairy Economy

Kanwarpal Singh Dhillon[1*] and Bikramjit Singh[2]

Buffaloes are rightly called the "Black Gold" of India, as they are a major source of milk, meat, and hides. In 2022-23, buffaloes contributed about 44.8% of India's total milk production, underscoring their vital role in the dairy sector. Unlike cows, buffaloes are well-adapted to diverse climatic conditions across India and exhibit greater disease resistance. They also maintain steady milk production even when fed on relatively low-quality fodder. This makes them highly valuable in the current scenario of agricultural challenges.

The best buffalo breeds of the world are found in northern India, particularly the Murrah and Nili-Ravi, which are globally recognized for their high productivity and quality milk.

Major Buffalo Breeds

Murrah: Known as the highest milk-yielding buffalo breed, it originated in Rohtak, Hisar, and Jind districts of Haryana, later spreading to adjoining regions. In Punjab, it is common in Nabha and Patiala areas. Murrah buffaloes yield 2,400-3,500 kg per lactation with fat content exceeding 7%.

Nili-Ravi: Famous for good milk yield and high-fat milk, this breed evolved from the earlier Nili and Ravi types, which merged through extensive crossbreeding. It is concentrated in districts like Amritsar, Gurdaspur, Tarn Taran, and Ferozepur. The average yield is 2,400-2,700 kg per lactation with fat content above 7%.

Contribution of Buffaloes to Punjab's Dairy Sector

Dairying forms the backbone of Punjab's rural economy. In 2020-21, agriculture and allied occupations contributed 27.7% of Punjab's GDP, with livestock accounting for 36.9% of agricultural income. Dairy alone contributed 82% of this livestock share.

Punjab leads the country in milk availability, with 1,283 grams per capita per day (2022-23) compared to the national average of about 444 grams. The state produced 14.30 million tonnes of milk in 2022-23, of which 59.4% came from buffaloes. Clearly, buffaloes are central to sustaining Punjab's dairy economy.

Buffaloes in Punjab are primarily reared for milk production, traditionally under a semi-intensive production system. In recent years, however, the dairy sector has gradually shifted toward a more intensive production model. This transformation, coupled with changes in breeding policies, has encouraged livestock keepers to include crossbred cows in their herds, leading to a noticeable increase in their population. Despite this trend, buffaloes continue to hold a prominent place in Punjab's dairying system due to their adaptability and economic value. In terms of production structure, most of the milk in Punjab (70%) is produced by small and medium dairy farms (2-10 animals). Large or commercial farms contribute around 25%, while domestic dairies account for about 1%, and the remaining 4% comes from peri-urban dairies.

Buffalo Population Trends

According to 2019-20 statistics, Punjab had 65.47 lakh dairy animals, of which 40.15 lakh (61.3%) were buffaloes. However, buffalo numbers have steadily declined from 57.64 lakh in 1992 to 40.15 lakh in 2019, showing a 22.2% drop since the last census in 2012 (Table 1).

Table 1: Buffalo Population (1992 to 2019)

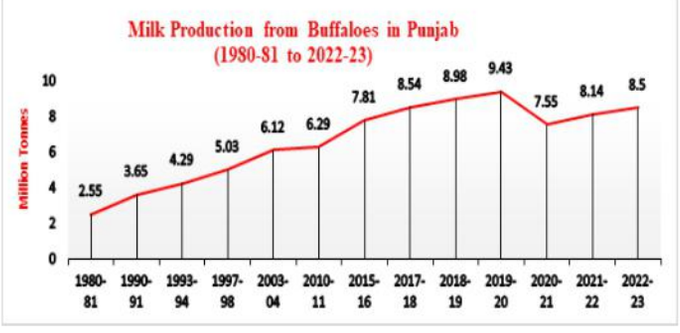
Category	Buffalo population (Lakhs) - Punjab						% Change
	1992	1997	2003	2007	2012	2019	2012-2019
Female Buffaloes	52.86	54.17	53.98	45.44	46.26	38.38	-17.0
Male Buffaloes	4.78	7.54	5.97	5.16	5.33	1.77	-66.8
Total Buffaloes	57.64	61.71	59.95	50.6	51.59	40.15	-22.2

Milk Production and Productivity

Punjab contributed 6.2% of India's total milk production (230.58 million tonnes) in 2022-23. Buffalo milk output in the state has risen steadily from 2.55 million tonnes in 1980-81 to 8.5 million tonnes in 2022-23.

- **District leaders:** Ludhiana recorded the highest buffalo milk production (1,016 tonnes), followed by Patiala (750 tonnes).
- **Productivity:** With 9.52 kg milk/day/animal, Punjab ranks second in India after Haryana but far above the national average (6.06 kg).

This progress is largely credited to the National Breed Improvement Programme, which promotes elite breeds like Murrah and Nili-Ravi. The target is to raise productivity to 11 kg/day/animal.



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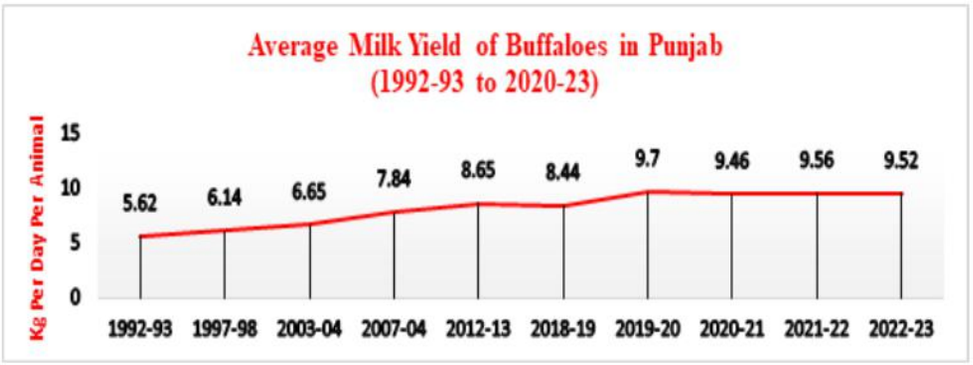


Advantages of Buffalo Milk

Buffalo milk contains 7.4% fat and 15.5% total solids, compared to cow milk's 4% fat. Thus, the milk of a buffalo producing 2,500 kg per lactation (7% fat) is nutritionally equivalent to the milk of a cow yielding 4,000 kg at 4% fat. Its rich fat content makes it ideal for producing ghee, mozzarella cheese, khoa, paneer, and milk powder. Additionally, buffaloes are generally more economical to maintain, with lower medical expenses compared to crossbred cows.

This is why, our state and country need to reform the breeding policy, in which the farmers should be encouraged to raise buffaloes as a major dairy animal because not only buffaloes are more productive than cows, but buffaloes are also used for meat purpose. This will increase the meat export and may also improve the agricultural economy.

Future Directions and Recommendations

Buffaloes will remain crucial to Punjab's dairy sector, but their declining population and rising preference for crossbred cows demand timely interventions. The following steps are recommended:

Value addition: Promote processing of buffalo milk into high-value products like mozzarella, khoa, sweets, and ghee, leveraging its superior sensory and nutritional properties.

Meat potential: Buffalo meat contributes 43.6% of Punjab's total meat output. Rearing male calves and utilizing unproductive animals can generate additional income and employment.

Early maturity: With first calving at 3.8 years, farmers face economic challenges. Research should focus on reducing age at first lactation, while governments can support farmers through targeted subsidies.

Viable herd size: Studies by Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (GADVASU) suggest that buffalo farms should maintain at least seven animals to be economically viable.

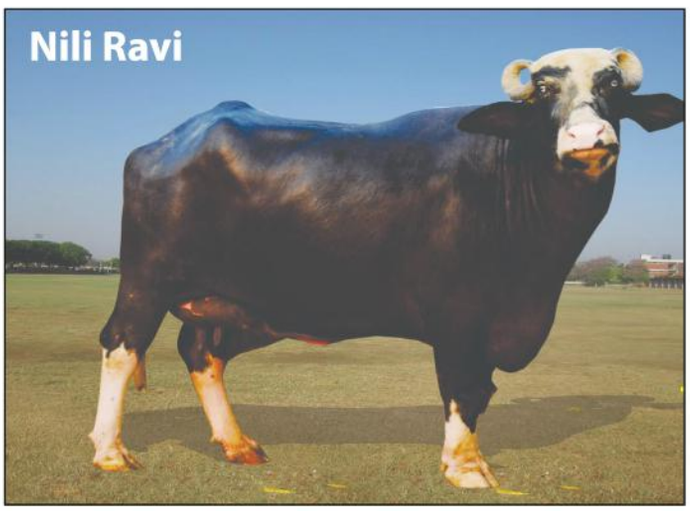
Record keeping: Encouraging farmers to maintain income-expense records will help identify gaps and maximize profits.

Training: Before starting dairy farming, farmers should undergo training at Krishi Vigyan Kendras, Punjab Dairy Development Board, or GADVASU, where they also learn about available government schemes and subsidies.

Conclusion

Buffaloes continue to be the backbone of Punjab's dairy industry, contributing significantly to milk, meat, and value-added products. With scientific interventions, policy support, and farmer training, Punjab has the potential to emerge as a global leader in buffalo dairying. Strengthening this sector will not only sustain rural livelihoods but also enhance the state's agricultural economy.

Kanwarpal Singh Dhillon[1*] and Bikramjit Singh[2]
[1]Assistant Professor, Krishi Vigyan Kendra, Amritsar, Punjab Agricultural University, Ludhiana, Punjab, India.
[2]In-charge, Krishi Vigyan Kendra, Amritsar, Punjab Agricultural University, Ludhiana, Punjab, India.



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Jihane Guihard
R&D Project Manager Techna

Samira El Mafadi Jian
Product Development Officer Techna

Phytogenics: What are They?

Phytogenics, also known as "phytobiotics" or "phytogenic feed additives", are derived from various parts of plants like herbs, spices and plant extracts and contain a vast array of bioactive compounds such as polyphenols, flavonoids or alkaloids.

These compounds exert their beneficial effects through multiple mechanisms, directly impacting key physiological systems and health status:

- **Botanicals and spices:** Such as oregano, ginger and garlic, used for their aromatic, savory, or biological properties.
- **Plant extracts:** Complex mixtures of active compounds obtained from various parts of plants (roots, leaves, flowers, fruits), for specific active components like flavonoids, saponins, or alkaloids.
- **Essential oils:** Concentrated liquids containing volatile compounds from plants (e.g., carvacrol from oregano, thymol from thyme, cinnamaldehyde from cinnamon), extracted through distillation or mechanical pressing.

The efficacy of phytogenics comes from their diverse array of key active principles and their complex mechanisms of action. These compounds work synergistically to exert a multitude of beneficial effects within the animal's body:

- **Antioxidant properties:** Many phytogenic compounds, such as polyphenols and flavonoids, are powerful antioxidants. They neutralize free radicals, reducing oxidative stress in animals, which can be particularly high during periods of stress, rapid growth, weaning or disease challenges. This helps to protect cells and tissues from damage, improving overall health and resilience.
- **Antimicrobial activity:** Essential oils and plant extracts often exhibit broad-spectrum antimicrobial properties against various bacteria, fungi, and viruses. This can help to control pathogenic microbial populations in the gut, reducing the incidence of enteric diseases and promoting a balanced gut microbiome.
- **Improved digestibility and nutrient absorption:** Some phytogenics stimulate the secretion of digestive enzymes and support gut morphology (villus height, crypt depth...). This leads to better digestion and absorption of nutrients from the feed, translating into improved feed efficiency and growth performance.
- **Intake stimulation:** The aromatic compounds in essential oils can enhance the palatability of feed, encouraging higher feed intake, especially during stressful periods or transitions, thereby supporting consistent growth.
- **Stress management:** Certain botanicals, such as passion flower, contribute significantly to improving animal well-being. They may exhibit anxiolytic and calming effects by modulating neurotransmitter systems like the GABAergic system. Their ability to support the antioxidant and natural defense system also help mitigate the negative effects of stress. By reducing the overall stress load on animals, phytogenics can lead to improved behavioral well-being, promoting more natural and less aggressive interactions and contributing to a calmer and more harmonious environment within the animal group.

Techna's Expertise in Formulating Solutions

At Techna, we use a science-driven approach to developing phytogenic products. The methodology is rooted in a deep understanding of botanicals, animal physiology, and the specific challenges faced by agricultural production sectors.

Techna develops phytogenic feed additives by starting in the field, with the identification of specific zootechnical or health problems. The scientific team, composed of veterinarians and animal nutritionists, works closely with farmers and animal specialists to understand the precise challenges faced by animals. This real-world insight guides the research and development, ensuring the solutions directly address the problematics on the ground.

The core of the expertise lies in the in-depth knowledge of over 100 active ingredients. The botanical experts possess an extensive understanding of plant biochemistry and physiology, knowing the active compounds responsible for biological effects and the most potent parts of plants.

The development process is backed by rigorous scientific research, which is continuously updated through ongoing research and analysis. It also includes collaborations with universities and research institutes for in-vitro trials, to measure biological indicators and biochemical effects of individual active substances. This allows not only to select the most active components, but also to understand the precise mechanism of action by which the phytogenics exert their benefits.

This expertise draws on decades of mastery in the synergy of botanical components. The individual active components and botanicals are combined to create sophisticated blends where compounds interact to enhance each other's efficacy, often leading to more potent and balanced outcomes than single-ingredient approaches.

These product combinations are tested in vivo through research programs and in experimental stations, as well as approved in commercial field trials to confirm their zootechnical benefits under diverse practical conditions.

In addition, Techna works on designing optimal delivery methods to ensure maximum bioavailability and efficacy within the animal.

Encapsulation of Plant-based Actives

Techna has developed expertise in protecting and delivering natural active ingredients with precision. This capability is a key differentiator, as the encapsulation of these compounds plays a strategic role in ensuring their effectiveness.

This technology involves enclosing one or more active principles within a protective matrix, creating a physical barrier that isolates them from their external environment. Encapsulation aims to protect these sensitive compounds, which are often fragile when exposed to oxygen, light, digestive pH, or enzymes. Thanks to adapted matrices, the active ingredients maintain their integrity from their incorporation until their release at the intended site of action (intestine, rumen, or other). This not only ensures better bioavailability but also prolonged and repeatable efficacy over time.

Beyond simple protection, encapsulation is also a tool for functional precision. It allows for controlled release (immediate, prolonged, or delayed), which can be adapted to the specific needs of the animal or technical constraints (mode of administration, solid or liquid formulation, stability in premix or complete feed). This level of mastery is the result of continuous research in galenic, coupled with rigorous in vitro trials conducted in collaboration with research institutes and field partners.

Adjusting Kinetics to Maximize Functional Efficacy

In line with its advanced galenic approach, Techna's Innovation department has dedicated several years to the comparative study of various encapsulation matrices, including cellulosic, lipid, and protein-based materials. The goal was to adapt the release mode of plant extracts to the specific physiological needs of the target animal species. This work has enabled us to design and validate, within our laboratory, three innovative release kinetic profiles based on differentiated encapsulation and process, optimized by rigorous in vitro trials:

- **CAPS-QR "Quick Release":** This allows for immediate release in the upper digestive tract. Ideal for fast-acting extracts (immune or antioxidant stimulation), it relies on matrices that disintegrate rapidly at neutral or acidic pH.
- **CAPS-SR "Slow Release":** This ensures prolonged release throughout the entire digestive transit. Suited for active ingredients with sustained effects (natural anti-inflammatories, metabolic regulators), it uses coatings that modulate diffusion based on pH or enzymes.
- **CAPS-DR "Delayed Release":** This targets specific areas of the lower digestive system, with delayed release allowing for local action (microbiota modulation, antimicrobial effect). It relies on coatings designed to resist the initial phases of digestion.

These differentiated galenic profiles offer flexibility in the use of plant extracts, allowing the release kinetics to be adapted to the biochemical nature of the active ingredient, the desired mode of action, and the animal's physiological context. This functional release design capability, coupled with fine control over manufacturing processes, constitutes a major technological advantage for the development of new-generation natural solutions for the different species (ruminant and monogastric).

Applications in Poultry and Swine

Gallicalm is a targeted phytogenic blend of aromatic substances and plant extracts, specifically formulated to control the negative effects of nervousness in poultry production. Its efficacy has been demonstrated in trials with laying hens, where it helped limit inappropriate behaviour such as feather pecking and scratching. Beyond behavioral improvements, Gallicalm also supports zootechnical performance (Figure 1).

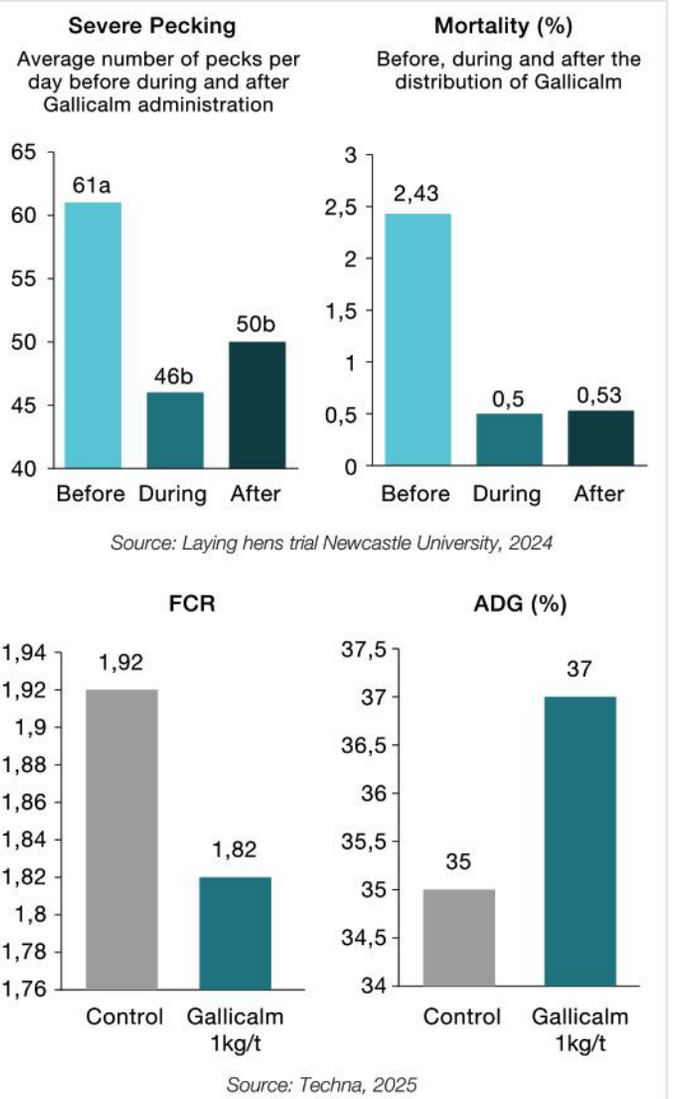


Figure 1. The effect of Gallicalm on poultry behaviour and performance

Robus Zen is a specialized mixture of aromatic substances and plant extracts designed to limit the negative effects of nervousness in pigs, such as biting or bullying. By promoting calmer social interactions, Robus Zen also helps improve growth performance on swine farms (Figure 2).

Both products reflect Techna's scientific approach, leveraging botanical expertise, advanced formulation, and targeted delivery to support behavioral management in livestock.

Overall, phytogenic solutions have proven to be a natural and effective lever for addressing the multiple challenges of animal production. Beyond promoting animal welfare and reducing stress, their antioxidant, antimicrobial and digestive properties contribute also to improved feed efficiency, growth performance and overall herd and flock resilience. By acting on multiple physiological pathways, they serve as a valuable complement or alternative to conventional approaches, helping reduce antibiotics and synthetic inputs.

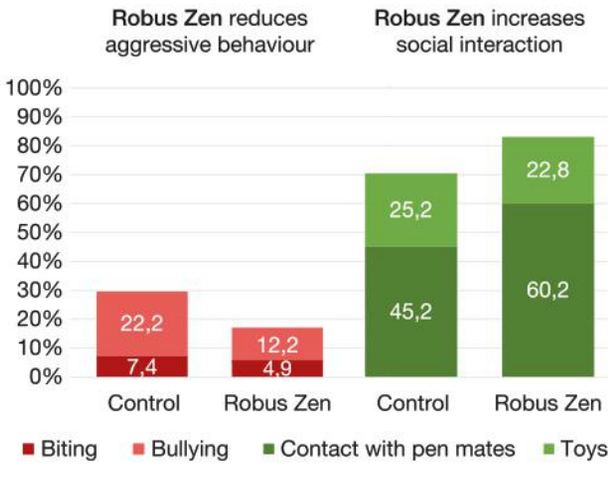
Backed by over 60 years of expertise in precision nutrition and natural health, Techna turns botanical science into practical solutions that support the livestock and feed industry in achieving optimal animal health, enhanced performance, and sustainable productivity.

About Jihane Guihard

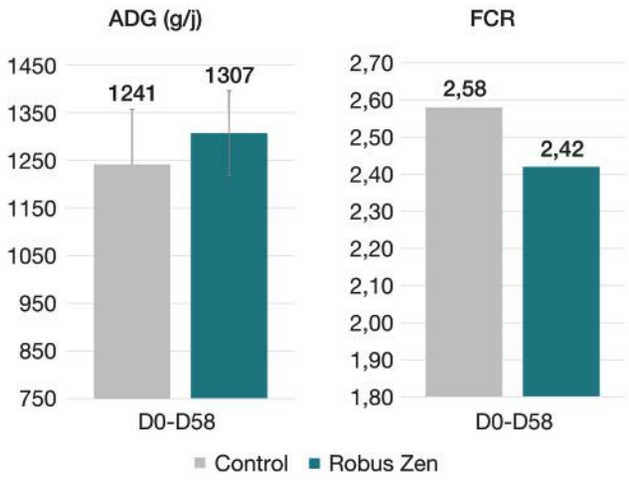
As R&D Project Manager at Techna, Jihane Guihard holds an engineering degree in product design and brings over fifteen years of experience in developing nutritional solutions. She has built deep expertise in phytotherapy and aromatherapy, driving projects that enhance both product efficacy and zootechnical performance.

About Samira El Mafadi Jian

Currently working as the Product Development Officer at Techna, Samira El Mafadi Jian holds a PhD in Food Process Engineering and brings over twenty years of expertise in the microencapsulation of active compounds. She has developed unique know-how in protecting and enhancing sensitive ingredients.



Source: France trial, Techna 2023



Source: Poland trial, Techna 2025

Figure 2. The effect of Robus Zen on pigs behaviour and performance

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ARTICLE

From Waste to Wealth:

Unlocking the Hidden Value of Animal By-products

Dr. Chandan Kumar, Dr Ajay Kumar, Md Danish and Dr Charu Singh
DUVASU Mathura (UP)

For centuries, farmers across the world have used livestock manure as a natural fertilizer to enrich soils and boost crop yields. However, the rise of modern, large-scale animal farms has created a new reality. Today, concentrated animal feeding operations (CAFOs) produce massive amounts of manure and wastewater in small areas. This has turned waste management from a simple on-farm task into a major environmental, economic, and public health challenge. But what if we no longer called these materials "waste"? What if we saw them as resources—packed with nutrients, energy, and raw materials waiting to be tapped? With the right technologies, animal waste can be converted into fertilizers, renewable energy, high-protein feed, and even marketable products like pellets, biochar, or decorative items. This shift is called waste valorization—and it's transforming livestock farming into a model for the circular bioeconomy.

Animal Waste Is More than Just Manure

When we say "animal waste," most people think of dung. But in reality, waste from livestock farms includes:

- **Solid manure** from cattle sheds, poultry litter, or open feedlots.
- **Slurry** from pig houses or dairy farms, where manure mixes with wash water.
- **Liquid effluents** from milking parlors, egg washing, or barn cleaning.
- **Slaughterhouse wastewater**—rich in blood, fats, proteins, and other organics.
- **Bedding materials** like straw, sawdust, or rice husks that mix with excreta.

All these materials are **nutrient-rich** and, with proper treatment, can become valuable products instead of polluting burdens.

Why Characterizing Waste Matters

Before deciding how to use waste, you need to **understand what it contains.**

Manure is usually classified into three main types:

1. **Solid manure (20%+ solids):**
   - Semi-solid or solid and can be stacked easily.
   - Common in beef feedlots and poultry litter.
   - Easy to compost or pelletize.
2. **Slurry manure (10-15% solids):**
   - Thick liquid that doesn't flow freely.
   - Needs pumps and special storage systems.
   - Found in swine houses or dairies with flushing systems.
3. **Liquid manure (<5% solids):**
   - Highly diluted and stored in ponds or lagoons.
   - Costly to transport long distances.
   - Often applied directly to fields using pumps or irrigation systems.

Nutrient content varies by species, diet, and age of the animals. For example:

- Dairy cows and beef cattle produce solid manure rich in nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg).
- Pigs produce slurry with moderate NPK levels.
- Poultry litter (broilers and layers) is nutrient dense with up to 40% solids content.

Slaughterhouse Wastewater - A Hidden Goldmine

Slaughterhouses produce a unique kind of wastewater loaded with organic matter: diluted blood, fat, and protein. If untreated, this can pollute rivers and trigger harmful algal blooms (oxygen-depleted "dead zones") while spreading pathogens. But this wastewater can also be a high-value resource. Modern biological treatment technologies such as: Upflow Anaerobic Sludge Blanket (UASB) reactors and Sequencing Batch Reactors (SBRs) can remove pollutants and recover nutrients and biogas. Since proteins make up to 70% of the organic content, slaughterhouse effluent is an ideal feedstock for energy production and nutrient recovery when managed properly.

Technologies to Transform Waste into Value

Livestock waste can be converted using biological, biochemical, physical, and thermal methods. The choice depends on waste type, scale of operation, and desired end product.

1. **Biological and Biochemical Pathways**

- Anaerobic Digestion (AD):
  - Microbes break down manure in sealed tanks without oxygen.
  - Produces biogas (methane-rich fuel) for on-farm power or sale to the grid.
  - Leaves behind digestate, a nutrient-rich fertilizer or bedding material.
  - Co-digestion with food or crop residues can boost gas yields and cut costs.
- **Composting:**
  - Manure is aerobically decomposed into stable compost.
  - High temperatures (up to 65°C / 150°F) kill harmful pathogens.
  - Resulting compost is lighter, less smelly, and easier to spread on fields.

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- **Vermicomposting (using worms):**
  - Worms digest organic waste to produce vermicompost, rich in available nutrients.
  - Highly popular for small farms and horticulture.
- **Insect and Algae Bioconversion:**
  - Black Soldier Fly Larvae (BSFL) consume manure, killing pathogens and turning nutrients into protein-rich insect biomass for poultry and fish feed.
  - Algae cultivation on dairy wastewater can create protein supplements and biofertilizers.

2. Physical and Thermal Methods

- **Solid-liquid separation:**
  - Mechanical presses or screens remove solids from slurry.
  - Solids can be composted or dried into pellets; liquids are easier to manage.
- **Pelletizing and Drying:**
  - Fresh or separated manure is compacted into dry pellets.
  - Easier to store, sell, and transport—even across states or countries.
- **Thermo-chemical conversion (Pyrolysis and Gasification):**
  - Heating manure in low oxygen converts it into bio-oil, syngas, and biochar.
  - Biochar improves soil fertility and traps carbon for centuries.
- **Rendering:**
  - Converts animal carcasses and by-products into tallow, carcass meal, and protein powder, reducing waste and adding value.

3. Creative Rural Startups in India

Indian entrepreneurs are already making flower pots, "Gobar Ganesha" idols, incense sticks, and insect repellents from cow dung. These small industries create rural jobs, new markets, and eco-friendly products—proving waste valorization is not just for high-tech farms.

Why This Matters to Farmers and the Planet

- **Economic Benefits:** Lower waste management costs and create new revenue streams.
- **Environmental Protection:** Reduce groundwater pollution, greenhouse gas emissions, and foul odors.
- **Sustainability:** Move towards a circular bioeconomy—where nothing is wasted and every output becomes an input for another process.

The Future of Animal Waste Management

Traditional land application of manure is no longer enough for modern livestock farms. Innovative, integrated waste-to-resource systems—combining composting, biogas plants, insect farming, and thermal technologies—will be the key to future success. Animal waste is not a burden. It's a goldmine. By embracing waste valorization, farmers can protect the environment, earn extra income, and turn today's pollution problem into tomorrow's agricultural solution.

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. Udeybir 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
Phone : (770) 493-9401
Email : info@ippexpo.org
Web : www.ippexpo.org

MARCH 2026

10-12 MARCH – VICTAM ASIA

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Adisseo Continues Its Series of

Technical Seminars on Smartline Range & CNCPS Model Workshop for Dairy Nutritionist, Farm Managers and Consultants

Technical Seminar on Smartline range (Metasmart Dry, Metasmart Liquid, Smartamine M and Rumensmart) and CNCPS workshop were held at Ludhiana on 5th Sept 2025 where strong participation from Feed Manufacturers, farm managers, dairy nutritionist & Consultants.

Mr Pargat Singh (STSM Ruminants and PAL) shared opening remarks and introduction of Adisseo to the audience. Followed by Dr Pritish Ramteke (Regional Business Manager Ruminants & PAL) share the objective of the CNCPS workshop. Objective is to upgrade formulation systems in India.

Then Mr Mike Shearing Global formulation expert from Adisseo gave a small presentation on latest developments on AA balancing for the Close up and milking animal diet. This presentation followed by practical training on AMTS formulation software to all the dairy managers, Nutritionist and Consultants.

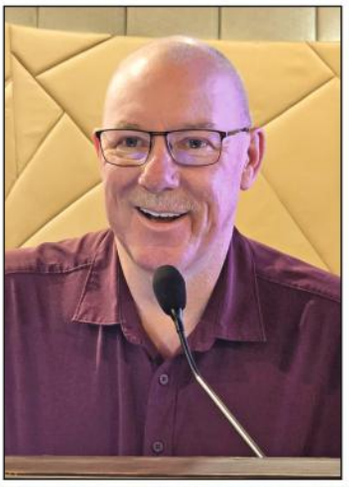
The events concluded with closing remarks from **Mr. Pargat Singh** who thanked all attendees for their engagement and support.

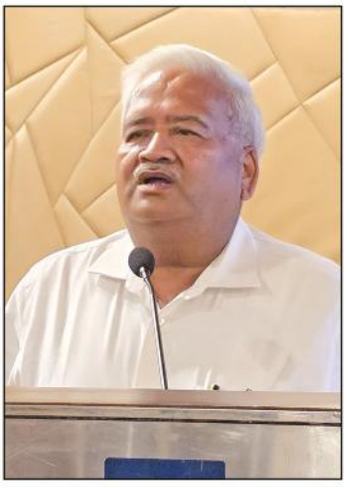
This workshop followed by Technical Seminar on Smartline Range of Adisseo. Where we launched new campaign on Health for lifetime performance. Mr Mike Shearing explained the benefits of Methionine feeding during close up and its positive effect on health of dairy cows.

Following to this presentation, Dr Pritish Ramteke explained Adisseo's Smartline range of products. Where we discussed on Metasmart dry, Metasmart Liquid, Smartamine M and Rumensmart. Also, it was explained that "Not all the Products are same". Different products, Different coating technologies, Different mode of action and different values of Metabolizable Methionine.

Last Mr Ashok Gupta (President AFMA) gave his thoughts on the Adisseo's positioning in Indian Market and how it is helping farmers and feed millers to improve profitability.

Closing remarks was done by Mr Pargat Sing and thank everyone who attended this workshop and technical seminar for there active participation with the promise of doing these kinds of engaging events for dairy customer in future as well to educate the customers on AA balancing.





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ARTICLE

Bunching Behaviour:
Signals Stress in Dairy Herd

T.K.S. Rao[1], Archita Singh[2], H.P. Thakor[3], Shashipal[4] Rajesh Kumar[5] Hemant Kumar[6]

Bunching behaviour in cattle is natural cow instinct also known as **protective grouping**, is a common behaviour where cattle form stable permanent groups in response to stressors or threats or discomfort for shared interests (Chopra *et al.*, 2024). Cattle group together even though; the bunching may be in less comfortable place of the barn which further worsen the situation. Efforts to disperse the assemblage are likely fail that may cause additional stress to animals and also the attendants. Stressors for same include heat stress (Erbez *et al.*, 2012), biting flies, lack of fresh air (poor ventilation) or even the presence of strange person. Cow bunching or herding together also associated with social dynamics of herd. Cow housed indoor moving away from side wall and congregating at centre at middle of barn. It is also considered as fresh air seeking behaviour. This behaviour Common north south as compared to east-west oriented barn.

Expression of bunching behaviour in cows in a slightly darker area of the barn with slow air flow during hot conditions. Bunching signal heat stress (high temperature humidity index THI), biting flies or insects, lack of fresh air and escaping of light. Cows congregate together in barn with ample free space remain unutilized. It is often difficult to determine the cause of bunching in barn. Drinking water reduce heat load of body through cooling of the digestive system, respiration and sweating. Cow consume about **50% of daily water intake *within an hour*** of milking, therefore offering fresh water at the exit of milking parlour is a very scientific approach.

Bunching behaviour offers social interactions among the member of the herd. It is actually response of cow to stress in order to share interest in resources such as feeding and watering areas also. It occurs at higher ambient temperature in order to share fly load or to seek shade and protection from direct sun light and heat stress.

Bunching behaviour estimated by spatial measures such as mean herd **intercow distance** (ICD) and mean herd **nearest neighbour distance** (NND). If ambient temperature is above 20°C, herd expressed higher bunching behaviour with reduced ICD and NND.

Cows always need space: Cows always need space and is always essential, however, bunching behaviour create unused space and thus create stress to the animals and herd.

Cows walk and stand with their head down and they need space for their head to move up and down freely. This also allow them to find safe foot placement, enables them to avoid dominant cow and give them room to respond to pain if animal self-isolate themselves. If heads of cows are up in barn it might be due to lack of sufficient space or they are too tightly packed.

Herd showing ***bunching behaviour*** in cows

Negative impacts of bunching behaviours in cattle: Negative effect of bunching behaviour in cows include

1) **Reduced feed intake and rumination:** Feeding pattern deviated from normal due to bunching, moreover, cow spent more time in cud chewing.
2) **Increased incidence of limping/ lameness:** While expressing the bunching behaviour decreases lying time which further intensify the lameness situation.
3) **Reduced milk production:** Bunching behaviour additionally decrease feed intake and its proper utilization which further worsen the production status of animals.
4) **Increased heat load:** Cows in bunch or close group are likely to experience the heat stress. Therefore, while resting cow during summer maintains a distance between the individual cows while in winter they maintain close sitting between the bunching members.
5) **Muddy areas:** Bunching on pasture can create muddy areas, increases risk of mastitis to cows and superficial loss of soil layer while mud formation.

6) **Hygienic issues:** Bunching behaviour sometimes splash manure on udders, potentially may infect udder to create mastitis.

7) **Compromised welfare status:** Bunching behaviour symbolize a stress and discomfort, potentially impacting overall wellbeing of the animals.

Management planning against the bunching behaviour in cattle:

1) **Heat abatement**: Using shades, fans and soakers which help cow to cool down during stress hours.

2) **Fly control:** Sting of insect cause grouping of cattle i.e., bunching behaviour (Ashmawy *et al.*, 2019). Mosquito net, smoke can be utilized to control insects in barn facilities. Observing the behaviour of cattle help to determine which type of flies may create a problem i.e., stable or face fly. Face fly congregate around eyes and house fly concentrated around nostril and mouths. Cleaning of spilled feed, facilities and reducing breeding area for fly such as wet areas. Fly repellent spray, fly tags may be used along with regular removal of manure promptly reduce heat load and fly population in barn.

3) **Ventilation & cooling system:** Provision of cross ventilation and fresh air may reduce stress and expression of bunching behaviour. Mechanically ventilated barn is also a very good management option.

4) **Water and feed access:** Access to plenty of fresh water is essential regardless of production system, as water cools the body after entry into digestive and respiratory system and finally inform of sweating. Moreover, feed is essential for offering energy to the

5) **Direct sunlight exposure:** Direct exposure of sunlight needs to avoided to control bunching behaviour in cattle. Shed cloth may be used from lit side to control light entry.

6) **Addressing stray voltage/ mild electric current:** Stary voltage is one of the potential stressors that can trigger this behaviour. Actually, stray voltage creates discomfort and some times pain leading cow to seek out areas where they perceive less electrical stimulus. This low intensity of electric current not perceive by human being; cows are comparatively more sensitive and can feel it clearly. Behavioural changes with respect to stary voltage include hesitation to enter the place, rapid exit from place, restlessness or nervousness, avoidance to water and feed source also.

7) **Increased lying time:** While bunching cows spend less time lying down to rest and ruminate and more time in standing which is detrimental to health and welfare of cattle. Prolong standing time due to expression of bunching behaviour increased incidence of limping (Blackie *et al.*, 2011) reduced feed intake and ultimately reduced milk production. Management practice to increase lying time include reducing heat stress, fly problems and improving ventilation.

8) **Managing social dynamics:** Bunching behaviour affects social dynamics within the herd. Younger or recessive animals may bunch together for protection against dominant individuals. Cows may bunch to facilitate social interaction like grooming or simply to be closed to familiar herd. Moreover, regularly observing social interactions can help identify and address intimidation or aggressive behaviour.

9) **Ensuring sufficient space per cow:** Pen design size and layout may be modified to allow more space per cow.

10) **Monitoring cow behaviour:** Regular visit through the barn particularly during afternoon hours to identify area of expression of bunching behaviour.

Heat stress: Results in expression of both hormonal and behavioural changes-

1) **Hormonal changes:** It include rise in concentration of GnRH, ACTH, Glucocorticoids and progesterone & decrease in prolactin, oxytocin, TSH, estrogen, T3, T4 etc.

2) **Behavioural changes:** It covers an increase in visit of water trough, no. of steps or speed, agonistic behaviour, difficult breathing, however, there is decrease in feed intake and resting/lying time.

Important signals expression in cow: Bunching behaviour also known as clustering with their head towards the centre and tail outwards i.e., head to centre and tail to outside. Increased proximity. Increased restlessness, movement towards shelter. Increased standing time, reduced inter-cow distance, seeking shade or ventilation, increased activity near water bodies

Concluding notes:

Cow bunching behaviour is a complex natural behaviour response to stress that affect welfare and management of cattle can be intervened by addressing issues creating stress to the cattle like rise in standing time, manure splashing and stress hormone release. This result in risk of lameness, reduced feed intake, rumination and reduction in milk production. Understanding behaviour is crucial to observe stress and bunching. Microclimate, electromagnetic waves also trigger the behaviour. Other factors include pests, feed, water also some time affect expression of bunching behaviour.

Heat abatement strategies, plenty of fresh air, water (8 linear metre water/100 cows), control of fly insects along with reduction in variation of light.

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