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Pulse of Livestock Industry

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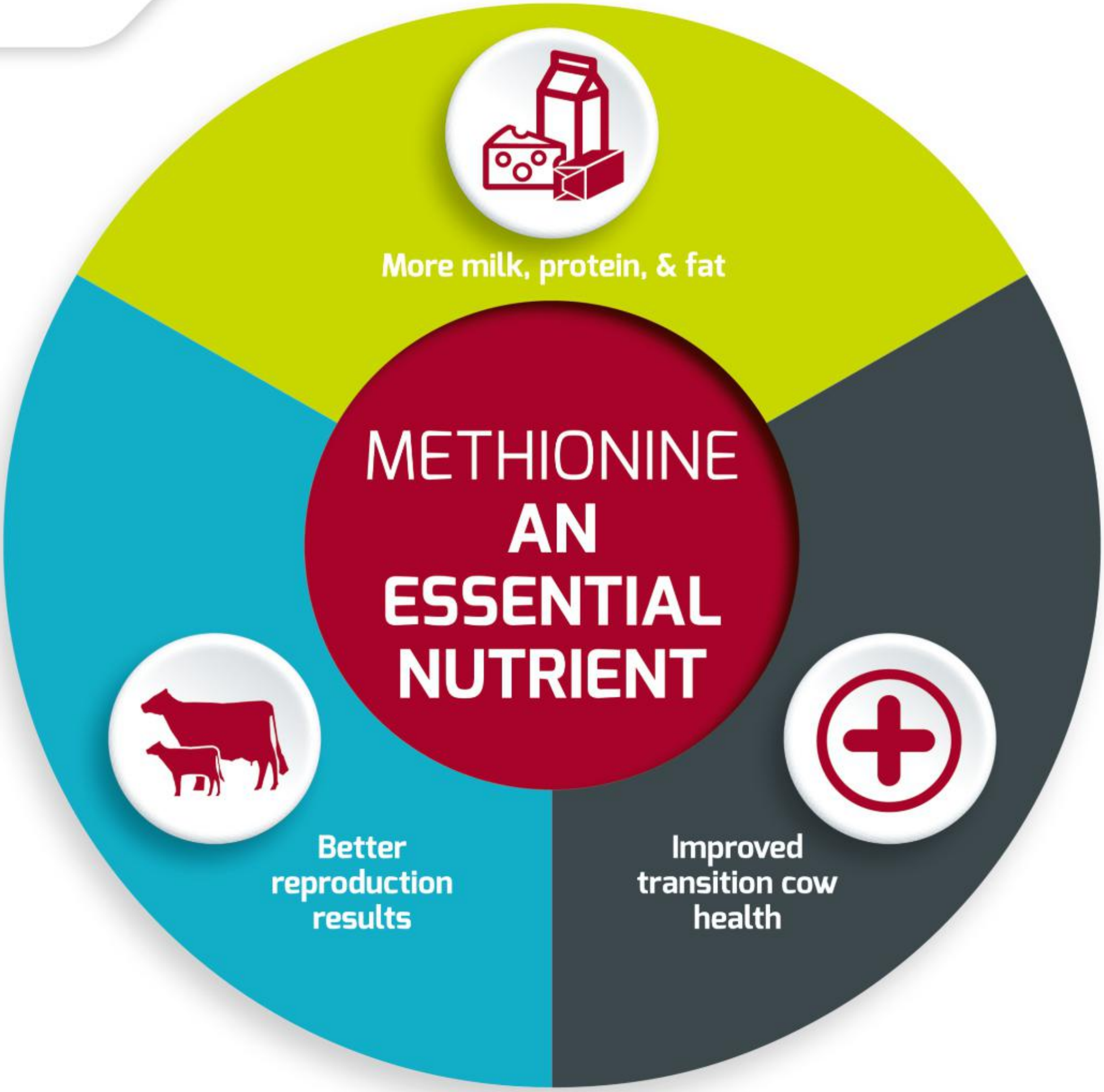

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From the Editor's Desk

Sri Lanka takes AMUL's help to become self-sufficient in Milk Production

The well-established and successful Amul model of dairy development through co-operatives is being exported to other countries across the world. A joint venture agreement has been signed between the National Dairy Development Board, Gujarat Cooperative Milk Marketing Federation, and Cargills of Sri Lanka to make the latter self-sufficient in the dairy industry. Some of the dairy farms under the government-controlled MILCO and the brand Highland will come under the JV. The country produces about 40 percent of its total domestic demand and depends on imports for the remaining. The new JV Company will take up the task of making Sri Lanka self-sufficient in the dairy industry in one decade. The agreement was signed in the presence of the President of Sri Lanka Ranil Wickremesinghe and India's External Affairs Minister S Jaishankar. Sri Lanka had collaborated with NDDB in 1997-2000 and earlier this year the government again sought assistance from India through NDDB and AMUL to help it achieve its nutritional requirements and improve the livelihoods of smallholder dairy farmers.

A coalition of 17 organizations has urged the Ministry of Fisheries, Animal Husbandry, and Dairying for immediate action on the critical issues engulfing the animal agriculture sector. The coalition has said that the G20 declaration has overlooked some challenges, which are instrumental to achieving the Sustainable Development Goals (SDGs). The declaration does not discuss the role of sustainable practices in economic stability and environmental sustainability, nor does it focus on financing sustainable agriculture and livestock-related projects within reforms in Multilateral Development Banks (MDBs). Five key areas are environmental and public health issues, gender equality and inclusion, economic resilience and sustainability, transparent and sustainable supply chains, and conflicts and vulnerabilities.

The government should divert land under rice and wheat towards maize production to produce around 50 to 60 MMT, which will meet the needs of feed, food, ethanol, and export sectors. Recently Government announced they would procure maize, pulses, and oilseeds through NAFED. The government banned exports of broken rice and deoiled rice bran (DORB). Millets prices are higher than maize in the last few years, making it unviable to use in animal feeds. There is a need to increase the area and yield of all oilseeds as well. It will be a win-win situation. Our edible oil imports will go down if we produce more oilseeds. We can always export surplus oilseed meals. FSSAI directed all cattle feed millers in India to use Bureau of Indian Standards (BIS) guidelines to control aflatoxin residues in milk and milk products. But penetration of cattle feeds is only 15%. How the government will control aflatoxin coming from green and dry fodders and concentrates fed directly to cattle in India? Fodder production and yield should go up in the coming years. Silage-making should be promoted. Dry fodder should be available at the right price throughout the year. There is a need for animal feed and fodder policy to secure feed and fodder availability to our livestock. Ration balancing should be promoted among farmers. Many startups are working in this area. There is a need to prepare a database of available feed resources. This information would be of immense use for policy-makers, government agencies, non-government organizations, intergovernmental agencies and development agencies, among others in formulating and implementing sustainable livestock development activities and in preparing and coping with climatic variations such as droughts, floods, severe winter weather events, and global climate change. There is a need to integrate a quality control system in feed analysis. NIR can play an important role in knowing the chemical composition of feed ingredients. Scientists and feed industries must ensure that quality control systems and good laboratory practices are used in feed analysis laboratories.

Area-specific mineral mixtures should be fed to our animals. A deficiency of minerals such as Co, Mo, Mg, Zn, Na, Cl, etc. could decrease rumen fermentation because these are vital for various activities of rumen microbes.

We should understand that animal diets have the same importance for animals as human diets have for humans. Animal nutrition must get due attention, especially at the policy level. Animal feeding will prove to be the foundation of efficient livestock production.

We also pay homage to Dr. M S Swaminathan who is known as the "Father of the Indian Green Revolution". He revolutionized agriculture and animal husbandry sectors, contributed to research, mentored, and emphasized sustainable farming, leaving an enduring legacy in Indian agriculture.

Editor

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1. ਊਰਜਾ ਭਰਪੂਰ ਖੁਰਾਕ: ਸਰਦੀਆਂ ਵਿਚ ਪਸ਼ੂਆਂ ਦੇ ਆਲੇ-ਦੁਆਲੇ ਦਾ ਤਾਪਮਾਨ ਕਾਫੀ ਘੱਟ ਜਾਂਦਾ ਹੈ ਅਤੇ ਪਸ਼ੂ ਨੂੰ ਦੁੱਧ ਬਣਾਉਣ ਦੇ ਨਾਲ-ਨਾਲ ਆਪਣੇ ਸਰੀਰ ਨੂੰ ਗਰਮੀ ਅਤੇ ਸ਼ਕਤੀ ਪ੍ਰਦਾਨ ਕਰਨ ਲਈ ਵੀ ਊਰਜਾ ਦੀ ਲੋੜ ਹੁੰਦੀ ਹੈ ਜੋ ਸੰਤੁਲਿਤ ਖੁਰਾਕ ਤੋ ਮਿਲਦੀ ਹੈ। ਸਿਆਣਿਆਂ ਦਾ ਕਥਨ ਹੀ ਨਹੀਂ ਸਗੋਂ ਸਾਇੰਸਦਾਨਾਂ ਦੀ ਖੋਜ ਅਤੇ ਸੂਝਵਾਨ ਡੇਅਰੀ ਫਾਰਮਰਾਂ ਦੇ ਤਜ਼ਰਬੇ ਨੇ ਸਿੱਧ ਕਰ ਦਿਤਾ ਹੈ ਕਿ ਪਸ਼ੂ ਨੂੰ ਚੰਗੀ ਖੁਰਾਕ ਦੇਣ ਨਾਲ ਦੁੱਧ ਦੀ ਉਪਜ 'ਚ ਕਾਫੀ ਵਾਧਾ ਹੁੰਦਾ ਹੈ। ਜੇਕਰ ਖੁਰਾਕ ਸੰਤੁਲਿਤ ਨਹੀਂ ਹੋਵੇਗੀ ਤਾਂ ਲਵੇਰੀਆਂ ਦਾ ਦੁੱਧ ਘਟ ਜਾਵੇਗਾ ਅਤੇ ਇਸਦਾ ਅਸਰ ਫੈਟ 'ਤੇ ਵੀ ਪਵੇਗਾ ਜਿਸ ਨਾਲ ਦੁੱਧ ਦੀ ਕੀਮਤ ਘੱਟ ਮਿਲੇਗੀ।

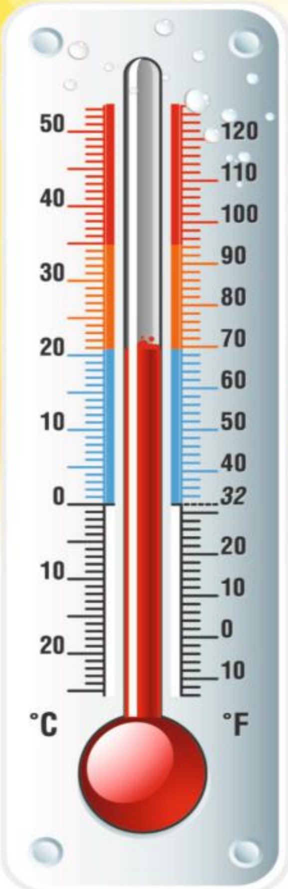
ੳ. ਪਸ਼ੂਆਂ ਲਈ ਊਰਜਾ ਦੇ ਮੁੱਖ ਸ੍ਰੋਤ ਹਨ ਕਾਰਬੋਹਾਈਡ੍ਰੇਟਸ ਜੋ ਕਿ ਹਰੇ ਚਾਰੇ ਜਿਵੇਂ ਬਾਜਰਾ ਜਾਂ ਅਨਾਜ ਜਿਵੇਂ ਕਿ ਕਣਕ, ਮੱਕੀ, ਚੌਲ ਕਣੀ ਆਦਿ ਤੋਂ ਵਧੇਰੇ ਮਾਤਰਾ ਵਿਚ ਮਿਲਦੇ ਹਨ। ਪਰ ਸਰਦੀਆਂ ਵਿਚ ਮੁੱਖ ਤੋਰ 'ਤੇ ਬਰਸੀਮ ਚਾਰੇ ਵਜੋਂ ਵਰਤਿਆ ਜਾਂਦਾ ਹੈ। ਡੇਅਰੀ ਮਾਹਰਾਂ ਵਲੋਂ ਬਰਸੀਮ ਵਿੱਚ ਸਰੋਂ ਅਤੇ ਜਵੀ ਮਿਲਾ ਕੇ ਬੀਜਣ ਦੀ ਸਲਾਹ ਦਿੱਤੀ ਜਾਂਦੀ ਹੈ। ਇਹ ਮਿਸ਼ਰਣ ਹਰੇ ਚਾਰਿਆਂ ਦਾ ਸਭ ਤੋਂ ਵਧੀਆ ਜੋੜ ਮੰਨਿਆ ਜਾਂਦਾ ਹੈ। ਬਰਸੀਮ ਵਿਚ ਪ੍ਰੋਟੀਨ ਵਧੇਰੇ ਹੁੰਦੇ ਹਨ ਪਰ ਕਾਰੋਹਾਈਡ੍ਰੇਟਸ ਘੱਟ। ਸੋ ਵੰਡ ਵਿਚ ਖਲਾਂ ਦੀ ਮਿਕਦਾਰ ਘਟਾ ਦੇਣੀ ਚਾਹੀਦੀ ਹੈ। ਜ਼ਿਆਦਾ ਖਲਾਂ ਦੀ ਵਰਤੋਂ ਕਰਨ ਨਾਲ ਪਸ਼ੂਆਂ ਦੇ ਖ਼ੂਨ ਵਿੱਚ ਯੂਰੀਆ ਦੀ ਮਾਤਰਾ ਵੱਧ ਜਾਂਦੀ ਹੈ, ਜੋ ਕਿ ਪਸ਼ੂਆਂ ਦੇ ਬਾਰ-ਬਾਰ ਫਿਰਨ ਦਾ ਮੁੱਖ ਕਾਰਨ ਬਣਦੀ ਜਾ ਰਹੀ ਹੈ। ਇਸ ਲਈ ਅਨਾਜ ਦੀ ਮਾਤਰਾ ਵਧਾ ਦੇਣੀ ਚਾਹੀਦੀ ਹੈ ਕਿਉਂਕਿ ਅਨਾਜ ਤੋਂ ਊਰਜਾ ਪੈਦਾ ਹੁੰਦੀ ਹੈ, ਜੋ ਦੁਧਾਰੂ ਪਸ਼ੂਆਂ ਲਈ ਠੰਡ ਦਾ ਮੁਕਾਬਲਾ ਕਰਨ ਲਈ ਅਤਿ ਜ਼ਰੂਰੀ ਹੈ।

ਅ. ਬਰਸੀਮ ਵਿੱਚ ਪਾਣੀ ਦੀ ਮਾਤਰਾ ਵਧੇਰੇ ਹੋਣ ਕਾਰਨ ਇਸਨੂੰ ਹਮੇਸ਼ਾ ਹੀ 10 ਤੋਂ 12 ਘੰਟੇ ਕੱਟਕੇ ਅਤੇ ਧੁੱਪ ਲਵਾ ਕੇ ਵਰਤਣਾ ਚਾਹੀਦਾ ਹੈ। ਠੰਡਾ ਬਰਸੀਮ ਪਸ਼ੂਆਂ ਲਈ ਨੁਕਸਾਨ ਦਾਇਕ ਅਤੇ ਜਾਨਲੇਵਾ ਵੀ ਹੋ ਸਕਦਾ ਹੈ। ਨਵੇਂ ਹਰੇ ਚਾਰੇ ਜਿਵੇਂ ਕਿ ਮੱਖਣ ਘਾਹ ਦਾ ਵੀ ਪ੍ਰਯੋਗ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

ੲ. ਬਾਈਪਾਸ ਫੈਟ: ਵਧੇਰੇ ਦੁੱਧ ਦੇਣ ਵਾਲੇ ਪਸ਼ੂਆਂ ਨੂੰ ਸੂਣ ਤੋਂ ਤੁਰੰਤ ਬਾਅਦ 45 ਦਿਨ ਤੱਕ ਬਾਈਪਾਸ ਫੈਟ ਦੇਣਾ ਬਹੁਤ ਹੀ ਲਾਹੇਵੰਦ ਹੈ। ਬਾਈਪਾਸ ਫੈਟ ਦੀ ਮਾਤਰਾ 100 ਗ੍ਰਾਮ ਪ੍ਰਤੀ 10 ਕਿਲੋ ਦੁੱਧ ਪ੍ਰਤੀ ਦਿਨ ਦੇ ਹਿਸਾਬ ਨਾਲ 2 ਬਰਾਬਰ ਹਿੱਸਿਆ ਵਿੱਚ ਵੰਡ ਕਰਕੇ ਸਵੇਰੇ ਸ਼ਾਮ ਦੇਣੀ ਚਾਹੀਦੀ ਹੈ। ਬਾਈਪਾਸ ਫੈਟ ਨਾਲ ਪਸ਼ੂ ਦਾ ਦੁੱਧ ਉਤਪਾਦਨ ਅਤੇ ਸਿਹਤ, ਦੋਵੇਂ ਵਧੀਆ ਰਹਿੰਦੇ ਹਨ। ਇਸ ਤੋਂ ਇਲਾਵਾ ਬਾਈਪਾਸ ਫੈਟ ਪਸ਼ੂ ਦੇ ਗੱਭਣ ਹੋਣ ਵਿੱਚ ਵੀ ਮਦਦ ਕਰਦੀ ਹੈ। ਸੋ ਪਸ਼ੂਆਂ ਨੂੰ ਵਧੇਰੇ ਊਰਜਾ ਭਰਪੂਰ ਖੁਰਾਕ ਦੇਣਾ ਹੀ ਸਰਦੀਆਂ ਵਿਚ ਵਧੇਰੇ ਦੁੱਧ ਪੈਦਾ ਕਰਨ ਦਾ ਰਾਹ ਹੈ।

ਸ. ਤਾਜ਼ੇ ਅਤੇ ਸੱਜਰ ਪਸ਼ੂਆਂ ਨੂੰ ਲੇਵੇ ਦੀ ਸੋਜ ਅਤੇ ਸੂਤਕੀ ਬੁਖਾਰ (ਮਿਲਕ ਫੀਵਰ) ਤੋਂ ਬਚਾਉਣਾ ਬਹੁਤ ਜਰੂਰੀ ਹੈ। ਇਸ ਲਈ ਖੁਰਾਕ ਵਿੱਚ ਵਿਟਾਮਿਨ ਈ, ਬਾਇਓਟਿਨ, ਨਾਇਆਸੀਨ ਅਤੇ ਲਘੂ ਤੱਤ ਜਿਵੇਂ ਕਿ ਜ਼ਿੰਕ, ਕਾਪਰ, ਕੋਬਾਲਟ ਅਤੇ ਮੈਗਨੀਜ਼ ਅਤੇ ਕਰੋਮੀਅਮ ਦੀ ਵਰਤੋ ਬਹੁਤ ਜਰੂਰੀ ਹੈ।

Temperature is rising...



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

Levucell® SC
Rumen Specific Yeast*

*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.*

For more information, please contact your feed distributor or Lallemand.

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2. ਠੰਡ ਤੋਂ ਬਚਾਅ: ਸਰਦ ਰੁੱਤ ਵਿਚ ਠੰਢੇ ਮੌਸਮ ਦਾ ਪ੍ਰਕੋਪ ਵਧੇਰੇ ਹੁੰਦਾ ਹੈ। ਠੰਡੀਆਂ ਹੱਡ ਚੀਰਦੀਆਂ ਬਰਫ਼ੀਲੀਆਂ ਹਵਾਵਾਂ, ਧਰਤੀ 'ਚੋਂ ਸਰੀਰ ਵਿਚ ਰਚਦੀ ਸੁੰਨ ਅਤੇ ਅਸਮਾਨ ਤੋਂ ਪੈ ਰਹੀ ਤ੍ਰੇਲ, ਕੋਹਰਾ ਆਦਿ ਮੁਸ਼ਕਿਲਾਂ ਵਿਚ ਵਾਧਾ ਕਰਦੇ ਹਨ। ਪਸ਼ੂਆਂ ਨੂੰ ਇਨ੍ਹਾਂ ਤੋਂ ਬਚਾਉਣ ਲਈ ਜੇ ਢੁਕਵਾਂ ਪ੍ਰਬੰਧ ਨਾ ਹੋਵੇ ਤਾਂ ਦੁੱਧ ਘੱਟ ਦੇਣ ਦੇ ਨਾਲ-ਨਾਲ ਪਸ਼ੂ ਬਿਮਾਰ ਹੋਣ ਦਾ ਖਦਸ਼ਾ ਵੀ ਡੇਅਰੀ ਫਾਰਮ 'ਤੇ ਮੰਡਰਾਉਣ ਲਗਦਾ ਹੈ। ਪਸ਼ੂਆਂ ਨੂੰ ਧੁੱਪ ਚੜਨ ਤੋਂ ਪਹਿਲਾਂ ਬਾਹਰ ਖੁੱਲੇ ਵਿੱਚ ਨਹੀਂ ਬਨਣਾ ਚਾਹੀਦਾ। ਛੋਟੇ ਕੱਟੜੂਆਂ - ਵੱਛੜੂਆਂ ਲਈ ਰਾਤ ਨੂੰ ਹੀਟਰ ਦਾ ਪ੍ਰਯੋਗ ਵੀ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਪਸ਼ੂਆਂ ਨੂੰ ਠੰਡ ਦੇ ਕਹਿਰ ਤੋ

ਬਚਾਉਣ ਦੇ ਢੰਗ ਹਨ:

ੳ. ਸਿੱਧੀਆਂ ਠੰਡੀਆਂ ਹਵਾਵਾਂ ਤੋ ਬਚਾਅ: ਜਿੱਥੋਂ ਤੱਕ ਹੋ ਸਕੇ ਪਸ਼ੂ ਦੇ ਸਰੀਰ ਨੂੰ ਸਿੱਧੀਆਂ ਠੰਡੀਆਂ ਹਵਾਵਾਂ ਤੋਂ ਬਚਾਉਣਾ ਚਾਹੀਦਾ ਹੈ। ਖੁਲ੍ਹੇ ਢਾਰਿਆਂ ਵਿਚ ਦੋਵੇਂ ਪਾਸਿਓਂ ਪਰਦੇ, ਸ਼ਟਰ, ਬੋਰੀਆਂ ਦੇ ਤੱਪੜ ਆਦਿ ਲਗਾ ਕੇ ਸਿੱਧੀ ਹਵਾ ਤੋਂ ਬਚਾਓ। ਸੱਜਰ ਸੂਏ ਪਸ਼ੂਆਂ ਨੂੰ ਅਤੇ ਤਿੰਨ ਮਹੀਨੇ ਦੀ ਉਮਰ ਤੱਕ ਦੇ ਕੱਟੜੂਆਂ ਵੱਛੜੂਆਂ ਨੂੰ ਸਿੱਧੀਆਂ ਠੰਡੀਆਂ ਹਵਾਵਾਂ ਤੋਂ ਬਚਾਉਣਾ ਬਹੁਤ ਜਰੂਰੀ ਹੈ। ਛੋਟੇ ਕੱਟੜੂਆਂ ਵੱਛੜੂਆਂ ਵਿੱਚ ਠੰਡ ਲੱਗਣ ਨਾਲ ਸਰੀਰ ਦਾ ਤਾਪਮਾਨ ਘਟ ਸਕਦਾ ਹੈ। ਜਿਸ ਨਾਲ ਕੱਟੜੂ ਵੱਛੜੂ ਦੀ ਮੌਤ ਵੀ ਹੋ ਸਕਦੀ ਹੈ। ਸੱਜਰ ਸੂਏ ਪਸ਼ੂਆਂ ਵਿੱਚ ਠੰਡੀ ਹਵਾ ਲੱਗਣ ਨਾਲ ਦੁੱਧ ਅਚਾਨਕ ਕਾਫੀ ਜ਼ਿਆਦਾ ਘੱਟ ਸਕਦਾ ਹੈ।

ਅ. ਸ਼ੈੱਡ ਦੀ ਦਿਸ਼ਾ: ਪਸ਼ੂ ਸ਼ੈੱਡ ਦੀ ਦਿਸ਼ਾ ਲੰਬੇ ਧੁਰੇ ਤੋਂ ਪੂਰਬ ਪੱਛਮ ਵੱਲ ਨੂੰ ਹੋਣੀ ਚਾਹੀਦੀ ਹੈ ਤਾਂ ਜੋ

ਸੂਰਜ ਦੀਆਂ ਕਿਰਣਾਂ ਅੰਦਰ ਤੱਕ ਪਹੁੰਚ ਸਕਣ। ਜਿੱਥੇ ਇਹ ਕਿਰਣਾਂ ਡੇਅਰੀ ਫਾਰਮ ਦੇ ਫਰਸ਼ ਨੂੰ ਸੁੱਕਾ ਰਖਦੀਆਂ ਹਨ ਉੱਥੇ ਸੂਖਮਦਰਸ਼ੀ ਜੀਵਾਣੂਆਂ ਦਾ ਨਾਸ਼ ਕਰਨ 'ਚ ਵੀ ਮਦਦਗਾਰ ਸਾਬਤ ਹੁੰਦੀਆਂ ਹਨ। ਖੁਰਲੀ ਹਮੇਸ਼ਾ ਉੱਤਰ ਦਿਸ਼ਾ ਵਿੱਚ ਹੋਣੀ ਚਾਹੀਦੀ ਹੈ।

ੲ. ਪਸ਼ੂਆਂ ਦਾ ਵਿਛਾਉਣਾ: ਜਿੰਨਾ ਪਸ਼ੂਆਂ ਨੂੰ ਧਰਤੀ ਤੋਂ ਚੜ੍ਹਨ ਵਾਲੀ ਸੁੰਨ ਤੋ ਬਚਾਉਣਾ ਜ਼ਰੂਰੀ ਹੈ ਉੰਨਾ ਹੀ ਪਸ਼ੂਆਂ ਦੇ ਸਰੀਰ ਦੀ ਗਰਮੀ ਰੋ ਕੰਨਡਕਸ਼ਨ ਰਾਹੀਂ ਧਰਤੀ ਵਿਚ ਵਿਸਰ ਜਾਂਦੀ ਹੈ, ਨੂੰ ਬਚਾਉਣਾ ਵੀ ਜ਼ਰੂਰੀ ਹੈ। ਇਸ ਕਰਕੇ ਪਸ਼ੂਆਂ ਥੱਲੇ ਪਰਾਲੀ, ਸੁੱਕੀ ਤੂੜੀ, ਜਾਂ ਲੱਕੜੀ ਦੇ ਬੂਰੇ ਆਦਿ ਦੀ 3-4 ਮੋਟੀ ਪਰਤ ਵਿਛਾਉਣ ਨਾਲ ਇਹ ਸਮੱਸਿਆ ਹੱਲ ਹੋ ਜਾਂਦੀ ਹੈ ਅਤੇ ਪਸ਼ੂ ਸੁੱਖ ਮਹਿਸੂਸ ਕਰਦੇ ਹਨ।

ਸ. ਪਸ਼ੂਆਂ ਨੂੰ ਧੁੱਪੇ ਕੱਢਣਾ: ਸਿਆਲਾਂ ਵਿਚ ਪਸ਼ੂਆਂ ਨੂੰ ਧੁੱਪ ਕੱਢਣਾ ਵੀ ਲਾਹੇਵੰਦ ਸਾਬਤ ਹੁੰਦਾ ਹੈ ਕਿਉਂਕਿ ਜਿੱਥੇ ਸੂਰਜ ਦੀਆਂ ਕਿਰਣਾ ਚਮੜੀ ਵਿਚ ਵਿਟਾਮਿਨ ਡੀ ਬਣਾਉਣ ਵਿਚ ਉਪਯੋਗੀ ਹੁੰਦੀਆਂ ਹਨ ਉੱਥੇ ਪਸ਼ੂਆਂ ਦੇ ਸਰੀਰ ਤੋਂ ਜੀਵਾਣੂਆਂ ਦੀ ਗਿਣਤੀ ਘੱਟ ਕਰਨ ਵਿਚ ਵੀ ਫਾਇਦੇਮੰਦ ਹੋ ਨਿਬੜਦੀਆਂ ਹਨ।

3. ਸਾਫ਼-ਸਫ਼ਾਈ: ਅਰੋਗਤਾ ਅਤੇ ਗੰਦਗੀ ਇਕ ਥਾਂ 'ਤੇ ਨਹੀ ਟਿਕਦੇ। ਜੇਕਰ ਸਫ਼ਾਈ ਹੋਵੇਗੀ ਤਾਂ ਰੋਗ ਦੂਰ ਰਹਿਣਗੇ। ਸੋ ਪਸ਼ੂਆਂ ਲਈ ਹੋਰ ਪ੍ਰਬੰਧਾਂ ਦੇ ਨਾਲ-ਨਾਲ ਸਫਾਈ ਵੀ ਉੰਨੀ ਹੀ ਜ਼ਰੂਰੀ ਹੈ। ਪਸ਼ੂਆਂ ਨੂੰ ਸਾਫ਼ ਰੱਖਣ ਤੋਂ ਭਾਵ ਹੈ ਉਹਨਾਂ ਦੇ ਸਰੀਰ ਤੋ ਮਿੱਟੀ ਘੱਟਾ, ਟੁੱਟੇ ਵਾਲ ਅਤੇ ਬਾਹਰਲੇ ਪ੍ਰਜੀਵੀਆਂ ਨੂੰ ਹਟਾਉਣਾ। ਸਫਾਈ ਕਰਨ ਨਾਲ ਚਮੜੀ ਦਾ ਖੂਨ ਸੰਚਾਰ ਵਧ ਜਾਂਦਾ ਹੈ ਜਿਸ ਨਾਲ ਪਸ਼ੂ ਦੀ ਸਿਹਤ ਚੰਗੀ ਜਾਪਦੀ ਹੈ। ਜਦੋਂ ਧੁੱਪ ਹੋਵੇ ਉਸ ਦਿਨ ਹੀ ਪਸ਼ੂ ਨੂੰ ਨੁਹਾਉਣਾ ਚਾਹੀਦਾ ਹੈ। ਪਸ਼ੂਆਂ ਦੀ ਸ਼ੈਡ ਨੂੰ ਤੱਪੜ ਜਾਂ ਪਰਦੇ ਟੰਗ ਕੇ ਰੋਜ਼ ਧੁੱਪ ਲਗਾਵਾਓ ਤਾਂ ਕਿ ਫਰਸ਼ ਸੁੱਕ ਸਕੇ। ਪਸ਼ੂਆਂ ਦੇ ਪੀਣ ਵਾਲਾ ਪਾਣੀ ਵੀ ਸਾਫ਼-ਸੁਥਰਾ ਅਤੇ ਤਾਜ਼ਾ ਹੋਣਾ ਚਾਹੀਦਾ ਹੈ। ਖਾਸ ਤੌਰ ਤੇ ਰਾਤ ਦਾ ਠੰਢਾ ਪਾਣੀ ਪਸ਼ੂ ਨੂੰ ਨਾ ਪਿਲਾਓ। ਭਰ ਜੋਬਨ ਸਿਆਲ ਵਿਚ ਹਮੇਸ਼ਾਂ ਨਲਕੇ ਜਾਂ ਮੋਟਰ ਦਾ ਤਾਜ਼ਾ ਪਾਣੀ ਹੀ ਪਸ਼ੂ ਨੂੰ ਪਿਲਾਉਣਾ ਚਾਹੀਦਾ ਹੈ।

4. ਟੀਕਾਕਰਣ: ਸਮੂਹ ਪਸ਼ੂਆਂ ਨੂੰ ਆਪਣੇ ਨੇੜੇ ਦੇ ਪਸ਼ੂ ਚਕਿਤਸਕ ਦੀ ਸਲਾਹ ਨਾਲ ਗਲ ਘੋਟੂ ਅਤੇ ਮੂੰਹ ਖੁਰ ਦਾ ਟੀਕਾਕਰਣ ਵੀ ਜਰੂਰ ਕਰਵਾਓ ਤਾਂ ਕਿ ਅਸੀਂ ਆਪਣੇ ਪਸ਼ੂਆਂ ਨੂੰ ਇਨ੍ਹਾਂ ਜਾਨ ਲੇਵਾ ਬਿਮਾਰੀਆਂ ਤੋਂ ਬਚਾ ਸਕੀਏ।

ਪਸ਼ੂਆਂ ਦੀ ਸਰਦੀਆਂ ਵਿਚ ਸਾਂਭ-ਸੰਭਾਲ ਸਬੰਧੀ ਉਪਰ ਦੱਸੇ ਨੁਕਤਿਆਂ 'ਤੇ ਅਮਲ ਕਰਕੇ ਅਸੀਂ ਆਪਣੇ ਪਸ਼ੂਆਂ ਨੂੰ ਸਰਦੀ ਤੋ ਬਚਾਅ ਹੀ ਨਹੀ ਸਕਦੇ ਸਗੋ ਉਹਨਾਂ ਤੋ ਸਮਰੱਥਾ ਮੁਤਾਬਿਕ ਦੁੱਧ ਉਤਪਾਦਨ ਲੈ ਕੇ ਆਪਣੀ ਆਮਦਨੀ ਵਿਚ ਵੀ ਚੋਖਾ ਵਾਧਾ ਕਰ ਸਕਦੇ ਹਾਂ।

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ARTICLE

Oncolytic Virotherapy - "A Viral Assault on Tumors"

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1. Introduction

Oncolytic virotherapy is a type of cancer treatment that uses viruses to target and kill cancer cells. Although it has been mainly researched and developed for human medicine, there is growing interest in applying this therapy to livestock as well. Oncolytic viruses, a category encompassing both naturally occurring and laboratory-modified viruses, possess a unique capability to infect and eliminate tumor cells while sparing healthy ones. This selectivity is achieved through genetic engineering or inherent traits that enable these viruses to replicate effectively within cancer cells. The field of virotherapy has evolved significantly, offering a diverse array of viruses with enhanced attributes, including improved systemic delivery, heightened tumor specificity, and superior oncolytic potency. Beyond their traditional role of directly eradicating cancer cells, emerging research suggests that certain oncolytic viruses may, in part, operate by eliciting an immune response against cancer.

When an oncolytic virus invades a tumor cell, it multiplies until the cell ruptures, releasing tumor antigens and triggering recognition by the immune system. This dual mechanism of cell lysis and immune response has been termed the "vaccine effect". Talimogenelaherparepvec (Imlygic® or T-VEC), an armed oncolytic virus engineered to stimulate immune cell production, gained FDA approval for melanoma treatment. This therapy involves localized injections into tumors, reducing the risk of herpes transmission.

2. The characteristics of oncolytic viruses can be summarized as follows:

2.1. Oncolytic Properties: These viruses selectively replicate within malignant cells, causing tumor cell lysis. Normal cells remain unaffected due to viral clearance. The release of viral progeny further infects neighboringtumor cells.

2.2. Immuno-Stimulatory Properties: Viral replication leads to oncolysis, releasing tumor-specific antigens and pattern molecules, initiating the presentation of antigens by dendritic cells and the activation of tumor-specific T cells. Concurrently, viral infection induces inflammation and chemokine release, attracting T cells to the tumor.

2.3. Oncolytic Viruses as Transgene Delivery Platform: Some oncolytic viruses can be modified to carry transgenes, such as cytokines or antibodies, for targeted delivery to the tumor microenvironment, amplifying the antitumor immune response. These are referred to as "armed oncolytic viruses".

3.Mode of action of Oncolytic Viruses:

3.1. Oncolytic viruses (OVs) are specifically designed to replicate within cancer cells, leading to the destruction of cancerous tissue without causing harm to healthy cells. This unique mechanism of action holds the potential to induce cancer regression or even complete cure in patients who have not responded to current treatment methods.Various viruses, such as adenovirus, herpes simplex virus, reovirus, poliovirus, and Newcastle disease virus, have demonstrated strong oncolytic properties.

3.2. Many OVs not only directly destroy cancer cells but also stimulate the body's immune response against cancer by releasing tumor-specific antigens upon cell lysis. This immune response, often referred to as the "vaccine effect," is further enhanced by the local inflammation caused by the replication of oncolytic viruses, which also aids in the destruction of the tumor's supporting structures, including its vasculature.

3.3. Due to this multifaceted approach, encompassing cell lysis, systemic anti-cancer immune response, and local inflammation, OVs show immense promise as novel anticancer agents. Additionally, combining OV therapy with conventional cancer treatments like chemotherapy and immunotherapy is feasible, further expanding their potential effectiveness.

4. Tactics for addressing obstacles in viral oncotherapy:

4.1. Resisting Antibody Neutralization: Employing genetic and chemical methods to shield the virus from antibody neutralization.

4.2. Improving Tumor Specificity: Targeting tumor-associated receptors and controlling post-entry viral replication to enhance specificity.

4.3. Enhancing Therapeutic Synergy: Developing rational combinations of virus families, engineering strategies, and complementary therapies to optimize efficacy, especially in cases with unmet clinical needs.

5. Obstacles and difficulties encountered in the field of oncolytic virotherapy include:

5.1. Virus Selection: Identifying suitable oncolytic viruses for specific livestock species is critical, necessitating tailored approaches.

5.2. Safety Concerns: Robust safety assessments and regulatory frameworks are essential to prevent unintended consequences when introducing oncolytic viruses to livestock populations. While oncolytic virotherapy offers potential benefits, it also presents adverse effects, including fever and flu-like symptoms. Additionally, there is a need to address concerns about virus shedding in bodily fluids. Advancements in virus production techniques may allow more aggressive dosing in future trials, emphasizing the importance of tumor specificity for maintaining safety profiles.

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5.3. Treatment Delivery: Developing effective delivery methods, such as direct injection or aerosol delivery, is crucial for livestock applications.

5.4. Economic Feasibility: The cost-effectiveness of oncolytic virotherapy in livestock must be evaluated, considering production, storage, distribution, and market demand.

6. Conclusion:

Oncolytic virotherapy holds the promise of transforming cancer treatment for livestock. Through continued research and a thorough examination of its challenges and prospects, this pioneering approach may open novel pathways for combating cancer and enhancing the health and welfare of animal populations. Nonetheless, realizing the potential of oncolytic virotherapy in treating livestock cancer demands comprehensive research efforts to tackle obstacles and evaluate safety, effectiveness, and economic feasibility within this specific context.

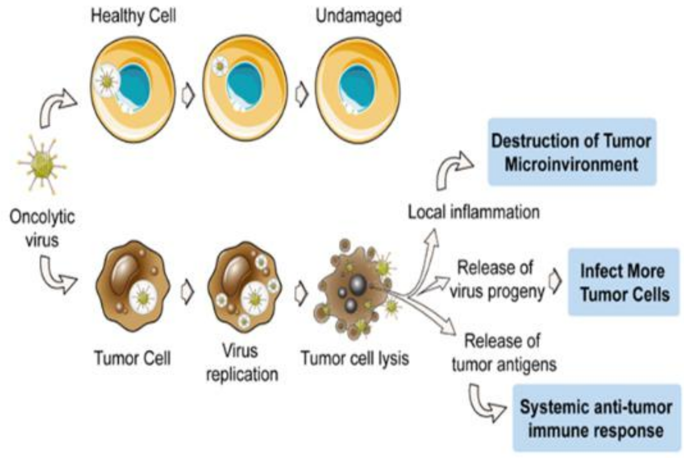

Figure.1 Mode of action of oncolytic viruses

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पशुओं में संकरण एवं आनुवंशिक उन्नयन के लाभ

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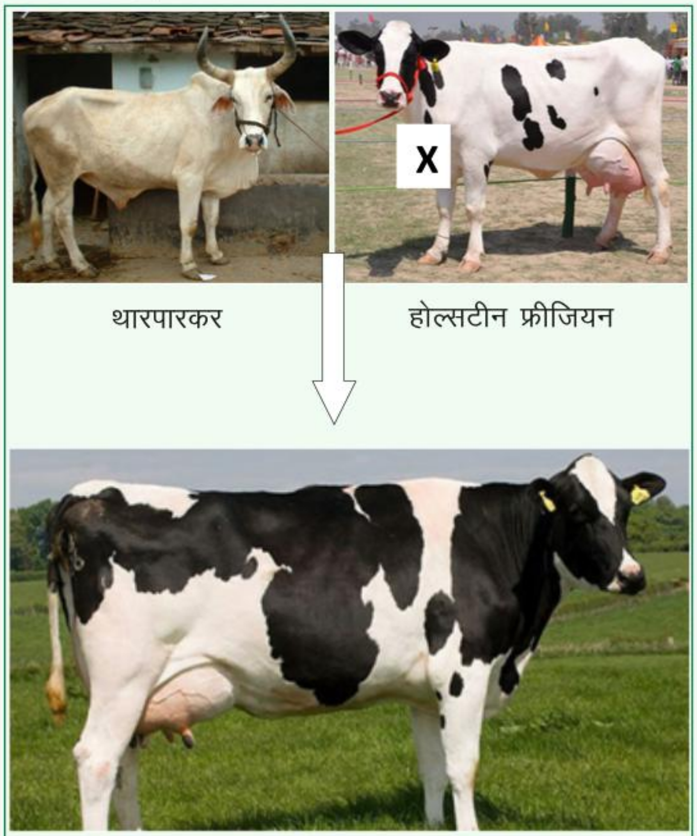
संकरण प्रजनन–दो अलग– अलग नस्लों के नर तथा मादा के बीच प्रजनन प्रक्रियासे संतानोत्पत्ति को संकरण कहते है। यह आमतौर पर किसी भी नस्ल में वांछनीय गुण (जो उसमें न हों) पैदा करने के लिए किया जाता है।



थारपारकर   होल्सटीन फ्रीजियन

करनफ्रिज

इस प्रजनन विधि के प्रयोग द्वारा संतान पशुओं को उत्पन्न कर बाजार में बेचा जाता, मुख्य रूप से सुअरों एवं ब्रोइलर्स में इस विधि का उपयोग मांस हेतु किया जाता है। दुग्ध उत्पादन को बढ़ाने के लिए भी इस प्रजनन विधि का प्रयोग किया जाता है, जिस से की पशुओं की नई नस्ल उत्पन्न होती है

वर्गीकरण : संकरण प्रजनन (Cross breeding) कई प्रकार से की जाती है –

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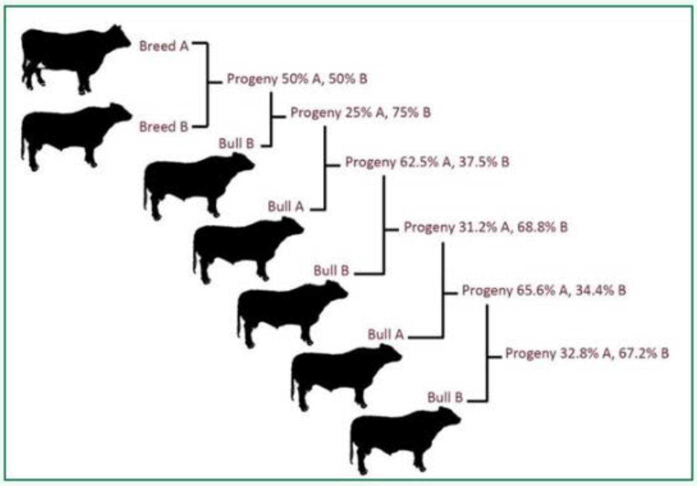
2. त्रिसंकरण/रोटेशनल क्रासिंग
3. पितृ संकरण/बैक क्रासिंग

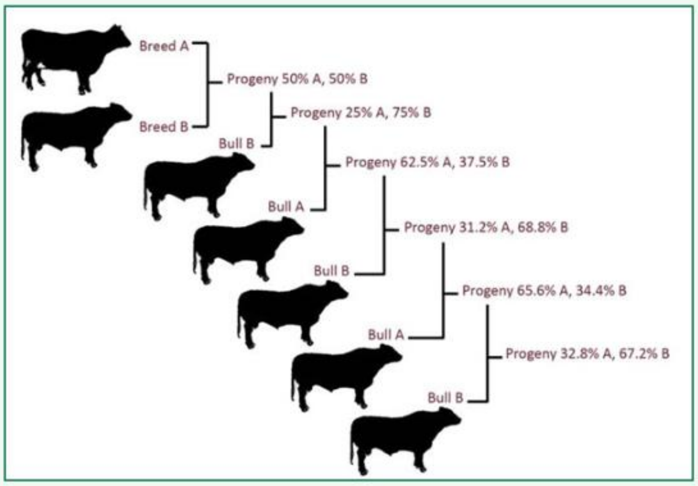
1. क्रिस क्रासिंग दृ इस प्रकार के संकरण में विविध / अलग–अलग नस्लों के नर एवं मादा को एकांतर



(Alternate) रूप से प्रजनन कराते है, इस विधि द्वारा उत्पन्न हुए मादा संतान में लगभग 2/3 रक्त

अपने तात्कालिक पिता से आता है एवं शेष रक्त (1/3) दूसरी उपयोग में लायी गई नस्ल से आता है

2. त्रिसंकरण – इस विधि से एक साथ तीन या इससे अधिक अलग–अलग नस्लों के एक ही प्रजाति के पशुओं का आपस में नियमित आवर्तन (Rotation) अनुसार प्रजनन करवाया जाता है। इसमें (ब) नस्ल के एक शुद्ध नस्ल के साण्ड को (अ) नस्ल की शुद्ध मादा से सहवास करवा कर उससे उत्पन्न मादा सन्तति को (स) नस्ल के शुद्ध नस्ल में नर से सहवास करवाया जाता है तथा उससे प्राप्त मादा सन्तति को (अ) नस्ल के शुद्ध नस्ल के नर (साण्ड) से सहवास कराया जाता है।

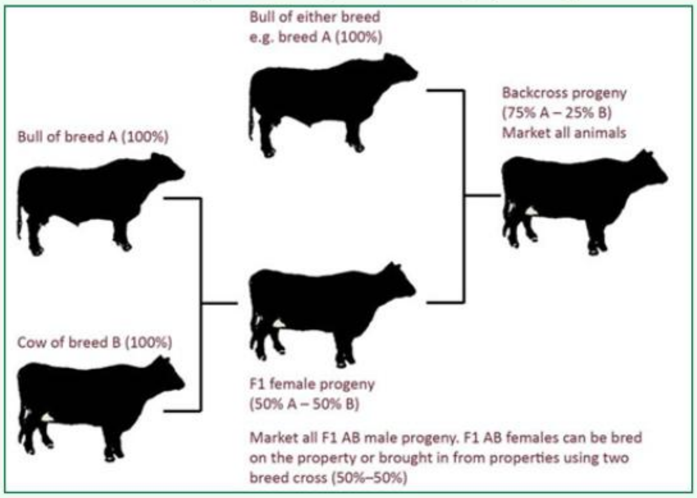


इस संकरण प्रजनन विधि के माध्यम से उपयुक्त नस्लों में से शुद्ध नस्ल के नर पशु के चक्रण से संतान में समयानुसार उच्च संकर शक्तिप्राप्त की जा सकती है।

यही अगर शुद्ध नस्ल के नर पशु की जगह संकर नस्ल का प्रयोग करे तो संकर शक्ति प्राप्त करने में अधिक समय लगता है।इसके अलावा, एक चक्र में शुद्ध नस्ल के पशुओं के उपयोग से, संकर नस्ल के पशुओं के उपयोग की तुलना में अधिक एकरूपता और कम परिवर्तनशीलता होगी।

3. पितृ संकरण – इसे बैक क्रॉस भी कहा जाता है, जिसका प्रयोग एक शुद्ध नस्ल को उपयोग में लाकर उत्पन्न संकर नस्ल को एक शुद्ध नस्ल में बदलने के लिए किया जाता है। प्रजनन की इस विधि में दो अलग दृअलग नस्लों के नर एवं मादा का सहवास कराया जाता है एवं उससे जो संतान प्राप्त होती है उसे पुनः अपने शुद्ध पैतृक से प्रजनन कराया जाता है।

बैकक्रॉसिंग के कई फायदे हैं। सबसे पहले, इसके द्वारा प्रजनक,



माता–पिता दोनों के वांछित गुणों के साथ एक संकर बना सकता है एवं इसका उपयोग एक ऐसा संकर जीव बनाने के लिए किया जा सकता है जो अपने पर्यावरण के लिए अधिक उपयुक्त हो और जिसमें अपने माता–पिता की तुलना में बेहतर गुण हों।

संकरण के लाभ –

1. किसी भी नई नस्ल उत्पन्न कर उसमे मंवांचित गुणों को प्राप्त किया जा सकता है
2. संकर संकर शक्ति के उपयोग से पशु, अभिभावक की तुलना में अधिक मजबूत, कठोर और बनते है
3. दीर्घायु और रोग प्रतिरोधक क्षमता में वृद्धि होती है
4. इस प्रजनन प्रकार के प्रजनन से उत्पन्न सन्तान अपने माता–पिता से ज्यादा किफायती होती है, उनमें शारीरिक विकास तेजी से बढ़ता है।

आनुवंशिक उन्नयन

आनुवंशिक सुधार (पशु प्रजनन) इस सिद्धांत पर आधारित है कि जानवरों द्वारा प्रदान किए जाने वाले उत्पाद (दूध, मांस, ऊन, आदि) और सेवाएं (जैसे परिवहन, भारोत्तोलन शक्ति (Draught) या सांस्कृतिक सेवाएं) उनके जीन और पर्यावरणीय प्रभावों का एक कार्य हैं। जिसमे वह रहते है

आनुवंशिक सुधार में समय लगता है और आनुवंशिक सुधार का चयन करते समय उत्पादन और बाजार की आवश्यकताओं के दीर्घकालिक दृष्टिकोण की आवश्यकता होती है। चूँकि स्थानीय उत्पादन या वातावरण जानवरों की जीवित रहने, उत्पादन और प्रजनन करने की क्षमता को प्रभावित करते हैं।

लाभ

1. आनुवंशिक सुधार से उत्पादकता और लाभप्रदता में वृद्धि होती है
2. व्यक्तिगत प्रजनकों और व्यापक भेड़ उद्योग को अताधिक लाभ होता है। (ऊन का वजन, फाइबर व्यास)
3. आनुवंशिक सुधार सेबाजार की आवश्यकताओं को पूरा करने में सहायता मिलती है।
4. पशुओ के विकास दर, शव उपज (Carcass Yield) और जन्म के समय वजन में भिन्नता मिलती है
5. खेत के जानवरों को परिस्थितियों को अनुकूलित करने और विभिन्न परिस्थितियों में जीवित रहने में सक्षम बनाने में मदद करता है
6. इसके अलावा, कृषि पशुओं का आनुवंशिक अनुकूलन जलवायु परिवर्तन, अत्यधिक गर्मी और ठंडनिपटने में एक महान भूमिका निभाता है।
7. बीमारी और परजीवी सहित पर्यावरणीय तनाव से निपटने में एक महान भूमिका निभाता है।

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Heat Tolerance Indices In Domestic Animals

Ankita Rautela*, Richa Rautela, Pramod Singh Painkra

Tolerance to heat stress is an adaptive process ensured by animals to withstand the effects of increase in ambient temperature beyond the temperature humidity index (THI) limit of thermal neutral zone (TNZ).

A heat-tolerant animal is the one which maintains homeothermy under high environmental heat loads. However, from a livestock breeding point of view, maintaining productive and reproductive levels under heat stress conditions might be the target. Maintaining homeothermy under such condition depends on the animal's ability to balance thermogenesis and heat dissipation.

To identify heat tolerance in animals several measures have been proposed as criteria; which include body temperature, respiration rate, heart rate, and sweating rate. The overall ability of the animal to cope with heat can be checked by performance of animal. Certain measures like hair and coat characteristics which includes hair shedding rate and body surface to mass ratio which are related to the animal's ability to dissipate internal heat have also been proposed as heat tolerant traits

Several biomarkers such as blood parameters or diverse molecules associated with the heat stress response have also been put forward as indicators of heat stress in livestock

Physiological characteristics such as body temperature or respiration rate are considered as important measures for heat tolerance, but their utilization in large-scale selection programs is still limited because it is expensive to collect these measurements. Biomarkers for heat stress can be detected in milk spectra, serving as apotential inexpensive tool to identify heat tolerant animals.

Mid-infrared spectroscopy can also be used to assess profiles of milk fatty acids as possible biomarkers for heat stress in dairy cattle.

Following indices may be applied for the determination of heat tolerance in animals:

1) Iberia Heat Tolerance Index (IHTI)

One of the earliest index developed by Rhoad, in 1944 to evaluate thermal stress in animals was the Iberian heat tolerance test, which uses the rectal temperature (RT) as a variable.

This method is performed in an open area between 10 AM to 3 PM when the ambient temperature ranges between 85-95 0 F, and rectal temperature and respiration rate of animals were recorded before and after exposure for three consecutive days.

The heat tolerance coefficient was calculated using formula-

HTC= 100-10 (RT-101)

Where HTC is Heat tolerance Coefficient

And RT is Rectal temperature

*HTC value exceeding 100 is indicative of heat tolerant animal

*If two animals are having same HTC value, then animal having less RR will be considered as more heat tolerant animal.

2) Gaalaa's Heat Tolerance Index

This index was given by R.F.Gaalaas in 1947.Gaalaas equation is a modification of Rhoad's equation (IBHC), and the study is performed under similar condition as in case of IBHC.

The value was calculated by using formula

HT = 100-14 (RT-101)

Where HT =Heat Tolerance

RT = Rectal Temperature

*HTC value exceeding 100 is indicative of heat tolerant animal

*If two animals are having same HTC value, then animal having less RR will be considered as more heat tolerant animal.

3) Benezra's Coefficient of Adaptability (BCA)

This index was given by M.V Benezra in 1954 using Rectal temperature and respirartion responses of animal after exposing them for 7 hrs for 3 consecutive days.

The value was calculated by using formula

BCA = RT/38.3 + RR/23

Where RT = Rectal Temperature

And RR = Respiration Rate

Normal RT (oC) = 38.33 Normal RR/min = 23

*BCA value of 2 is indicative of maximum adaptability and values more than 2 indicates lower adaptability

4) Dairy Search Index (DSI)

It was given by CK Thomas and coworkers in 1973. Physiological parameters i.e rectal temperature and respiration rate and pulse rate is recorded and the value of DSI/DI is calculate d accordingly. For this the animals are exposed for 7 hrs on sunny coudy day.

The values are calculated by the formula

DSI = 0.5 X1/X + 0.3 Y1/Y + 0.2 Z1/Z

Where X1, Y1 and Z1 represents rectal temperature, pulse rate and respiration rate after exposure and X, Y and Z asthe same parameters before exposure respectively.

* If the calculated value of DSI is more nearer to one than the animals is more heat tolerant.

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HOW THE RUMEN WORKS

Cattle have been coined "upcyclers" due to their ability to turn natural resources and by-products that are inedible to humans, into higher value, high quality protein source in the form of beef. An estimated 35% of the US mainland is unable to support cultivated agriculture, thus grazing animals are highly valued to utilize the otherwise wasted rangeland to upcycle nutrients to high-quality protein needed in the human diet.

The reason cattle are able to upcycle low quality forages and by-products is due to their anatomy and physiology of the ruminant digestive tract, more specifically, the symbiosis of diverse microbiota in the rumen.

Physical Structure of the Rumen

The digestive system of a ruminant consists of three pre-gastric fermentation compartments including the rumen, reticulum, and omasum as well as one "true stomach" called the abomasum, with each compartment having specific roles in digestion and absorption of nutrients. The pre-gastric fermentation compartments are what allow ruminants to utilize low quality, roughages and convert these into nutrients needed for production and growth.

The reticulum is a honeycomb-like structure and serves to move ingesta into the rumen and into the omasum and plays a key role in regurgitation and rumination. The rumen is the largest compartment in adult ruminants and often described as a fermentation vat where feeds are broken down and digested by enzymes produced by rumen microbes including, bacteria, protozoa and fungi.

The rumen and the reticulum continuously go through a cycle of contractions every 1 to 3 minutes that begin in the reticulum and passes caudally, or in a head to tail direction, through the rumen. Rumen motility serves to mix rumen contents, aid in eructation or expulsion of gases and continuously propel fermented feedstuffs of small enough particle size to pass through the reticulum to the omasum and gastrointestinal tract.

Particles that are heavy, dense or too large to pass to the omasum will collect and form a bolus in the reticulum, and are regurgitated to be rechewed. During the rumination process, feed particles are further mechanically reduced in particle size, increasing surface contact for further microbial degradation. An important aspect of chewing is the reintroduction of saliva that not only lubricates chewing activity but is also rich in bicarbonate, which serves as an important buffer to neutralize rumen pH.

The rumen wall is an important site of nutrient absorption and recirculation. The wall is lined with papillae, or finger-like projections that increase the surface area for better absorption of nutrients such as volatile fatty acids (VFA) produced by the microbial fermentation process. Care must be taken to promote good rumen papillae health through diet and nutrition to optimize papillae size and length since changes respond to concentrations of VFA in the rumen. Cattle on a high plane of nutrition with abundant VFA production have more robust papillae compared to cattle in a deficient nutrient state have smooth and short papillae with reduced absorption capabilities.

The rumen "bugs"

The reason that the rumen is so important is because cattle rely on the microbiota living in the rumen to convert feed into sources of energy and protein for the animal. A common phrase in ruminant nutrition and production systems is to "feed the bugs." When the rumen microbial population receive adequate nutrition and proper feeding management, they are able to be more efficient and productive.

There are billions of microbes in the rumen consisting primarily of different bacteria and protozoan species. The term "feed the bugs" is commonly associated with ensuring ruminants receive adequate crude protein, including rumen degradable protein and non-protein nitrogen. These components are broken down by the rumen microbiota into amino acids and ammonia that are utilized for microbial proliferation which in turn converts low value N sources into high quality microbial crude protein that provides the building blocks for animal growth and production.

The type and species of microbiota in the rumen are greatly dependent on diet and serve different functions. For instance, some species thrive at lower pH and digest starch and sugar, while others thrive a higher pH and digest cellulose. A shift in rumen pH can manipulate the rumen environment and promote or diminish certain microbial populations. This is important when considering diet and ingredient changes, feed intake behavior, feed additives such as phytogenic feed additives, ionophores, and direct fed microbials, among many other factors.

End Products

As the primary energy source for cattle are carbohydrates (cellulose and starch), the microbes break down these complex carbohydrates into glucose and then converted into large amounts of VFA and gases through ruminal fermentation. There are three primary VFAs produced in the rumen: acetate, propionate, and butyrate, some of which are absorbed across the rumen wall and provide more than 70% of the ruminant's energy supply.

Diet composition, either fiber or starch, influences microbial populations and the relative proportions of VFA produced. For instance, in high-roughage fed cattle there is more acetate produced and can reach 4 to 6 times the amount of propionate. In high-grain fed cattle, the amount of acetate produced is reduced to approximately 2 times the amount of propionate.

The process of converting structural carbohydrates to VFA is inefficient due to the loss of energy to heat and methane (Ch_4). When acetate is produced there is a loss of one carbon molecule to produce carbon dioxide (CO_2), which is used by methanogens to produce methane and eructated. However, when propionate is produced, there is not an extra carbon released to produce methane, giving it a greater energy value compared to acetate and butyrate.

During microbial fermentation, large amounts of gases are produced including CO_2 and CH_4, which must be eructated, or belched out. In certain conditions when the animal cannot eliminate the gas as quickly as it is produced due to impaired motility or obstruction of the esophagus (gas bloat) or when gases become entrapped in a foam due to consumption of foaming agents such as soluble protein (frothy bloat), the rumen will become distended and they will become bloated. Bloat can cause suppressed respiration and increased absorption of CO_2, which can lead to death.

In addition to energy metabolism, another critical piece is the role the rumen plays in nitrogen metabolism and microbial crude protein, or crude protein provided from the "bugs" themselves. Microbes turn over rapidly in the rumen, creating a continuous flow of microbial crude protein to the lower gastrointestinal tract that contributes to the animal crude protein requirements. Microbial crude protein is considered the most important protein source for cattle and is estimated to supply approximately 50 to 100% of the daily metabolizable protein required by the animal. Therefore, the importance of providing adequate rumen degradable protein and non-protein nitrogen for the rumen microbiota is essential in optimizing rumen functionality.

Conclusion

The digestive tract of a ruminant animal is complex but understanding basic factors that influence rumen function can impact overall health and performance of the animal. There are a number of strategies specifically targeted to promote and optimize rumen function including considerations for supplying appropriate roughage content in the diet, roughage particle length, balanced nutrition to provide sufficient nutrients, and some rumen pH and microbiota modulators that can play a role in achieving greater success in maintaining rumen health and functionality.

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**ਸਹਾਇਕ ਪ੍ਰੋਫੈਸਰ, ਵੈਟਰਨਰੀ ਪੈਥੋਲੋਜੀ ਵਿਭਾਗ,
ਖਾਲਸਾ ਕਾਲਜ਼ ਆਫ ਵੈਟਰਨਰੀ ਅਤੇ ਐਨੀਮਲ ਸਾਂਈਂਸਜ਼, ਅੰਮ੍ਰਿਤਸਰ, ਪੰਜਾਬ, ਭਾਰਤ

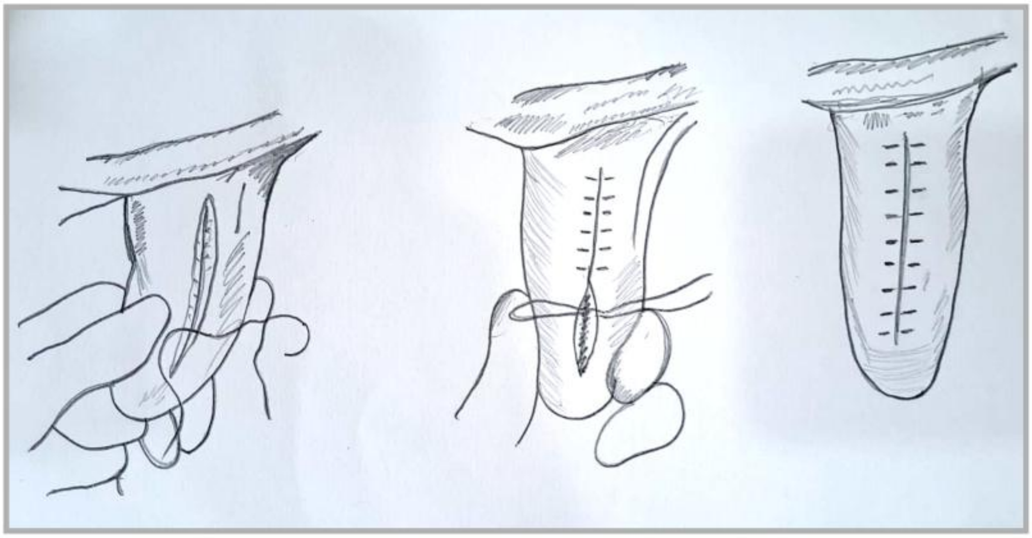
ਡੇਅਰੀ ਜਾਨਵਰ ਆਪਣੇ ਦੁੱਧ ਦੇਣ ਦੇ ਉਦੇਸ਼ ਲਈ ਜਾਣੇ ਜਾਂਦੇ ਹਨ। ਜ਼ੀਰੋ ਚਰਾਉਣ ਪ੍ਰਣਾਲੀਆਂ ਵਿੱਚ ਪਾਲਣ ਵਾਲੇ ਡੇਅਰੀ ਪਸ਼ੂਆਂ ਵਿੱਚ ਟੀਟ ਲੇਸਰੇਸ਼ਨ ਇੱਕ ਆਮ ਘਟਨਾ ਹੈ ਅਤੇ ਦੁੱਧ ਦੇ ਉਤਪਾਦਨ ਵਿੱਚ ਨੁਕਸਾਨ ਦਾ ਕਾਰਨ ਬਣਦੀ ਹੈ (ਨਿਕੋਲਸ, 2008)। ਟੀਟ ਦੀਆਂ ਸੱਟਾਂ ਦੀਆਂ ਦੋ ਕਿਸਮਾਂ ਹੁੰਦੀਆਂ ਹਨ, ਬਾਹਰੀ ਸੱਟਾਂ ਵਿੱਚ ਹਰ ਕਿਸਮ ਦੇ ਜ਼ਖਮ ਸ਼ਾਮਲ ਹੁੰਦੇ ਹਨ ਜਦੋਂ ਕਿ ਅੰਦਰੂਨੀ ਸੱਟਾਂ ਵਿੱਚ ਪੈਪਿਲਰੀ ਡੈਕਟ ਅਤੇ ਟੀਟ ਸਿਸਟਰਨ ਦੀਆਂ ਬਿਮਾਰੀਆਂ ਸ਼ਾਮਲ ਹੁੰਦੀਆਂ ਹਨ। ਜਿਵੇਂ ਕਿ ਡੇਅਰੀ, ਖੇਤੀਬਾੜੀ ਨਾਲ ਸਬੰਧਤ ਹੈ, ਪਸ਼ੂਆਂ ਨੂੰ ਸੱਟ ਲੱਗਣ ਦਾ ਖਤਰਾ ਵਧਦਾ ਹੈ ਭਾਵੇਂ ਇਹ ਖੇਤੀਬਾੜੀ ਦੇ ਸੰਦਾਂ, ਕੰਡਿਆਲੀ ਤਾਰਾਂ ਆਦਿ ਕਾਰਨ ਹੋ ਸਕਦਾ ਹੈ। ਲੇਵੇ ਅਤੇ ਟੀਟਸ ਬਾਹਰੀ ਸਦਮੇ ਜਾਂ ਸੱਟ ਲਈ ਸਭ ਤੋਂ ਵੱਧ ਸੰਵੇਦਨਸ਼ੀਲ ਹੁੰਦੇ ਹਨ ਕਿਉਂਕਿ ਉਹਨਾਂ ਦੇ ਸਰੀਰਿਕ ਸਥਾਨ ਵਿੱਚ ਵਾਧਾ ਹੁੰਦਾ ਹੈ। ਦੁੱਧ ਚੁੰਘਾਉਣ ਦੌਰਾਨ ਲੇਵੇ ਅਤੇ ਟੀਟਸ ਦਾ ਆਕਾਰ (ਵੀਵਰ ਐਟ ਅਲ., 2005)। ਟੀਟ ਲੇਸਰੇਸ਼ਨ ਦੇ ਹੋਰ ਕਾਰਨਾਂ ਵਿੱਚ ਰਸਾਇਣ, ਵਾਤਾਵਰਣ ਦੀਆਂ ਸਥਿਤੀਆਂ, ਕੀੜੇ-ਮਕੌੜੇ ਅਤੇ

ਦੁੱਧ ਦੇਣ ਵਾਲੀ ਮਸ਼ੀਨ ਸ਼ਾਮਲ ਹੋ ਸਕਦੇ ਹਨ। ਉਸੇ ਜਾਨਵਰ ਦੇ ਤਿੱਖੇ ਖੁਰ ਦੁਆਰਾ ਇਲਾਜ ਨਾ ਕੀਤਾ ਗਿਆ ਜ਼ਖ਼ਮ ਵੀ ਟੀਟ ਲੇਸਰੇਸ਼ਨ (ਸਿੰਘ ਐਟ ਅਲ., 2012) ਦਾ ਨਤੀਜਾ ਹੋ ਸਕਦਾ ਹੈ। ਲੇਵੇ ਦੇ ਢਾਂਚਿਆਂ ਨੂੰ ਨੁਕਸਾਨ ਦੀ ਹੱਦ ਟੀਟ ਟਰਾਮਾ ਦੀ ਗੰਭੀਰਤਾ ਨੂੰ ਦਰਸਾਉਂਦੀ ਹੈ (ਸ਼ਰਇਣੁ ਏਟ ਉਲ., 2014) ਅਤੇ ਉਚਿਤ ਉਪਾਵਾਂ ਦੁਆਰਾ ਪ੍ਰਬੰਧਿਤ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ (ਬ੍ਰੋਏਰਟਸ ਓਨਦ ਵਿਸਹਾਚਿਕ, 2010)। ਕਿਸਾਨਾਂ ਨੂੰ ਆਰਥਿਕ ਨੁਕਸਾਨ ਤੋਂ ਬਚਾਉਣ ਲਈਪ੍ਰਭਾਵਿਤ ਪਸ਼ੂਆਂ ਵਿੱਚਸੈਕੰਡਰੀ ਬੈਕਟੀਰੀਆ ਪ੍ਰਵੇਸ਼ ਕਰਨ ਦੀ ਲਾਗ ਨੂੰ ਰੋਕਣ ਲਈ ਡੂੰਘੇ ਜ਼ਖਮਾਂ ਦਾ ਜਲਦੀ ਇਲਾਜ ਕੀਤਾ ਜਾਣਾ ਚਾਹੀਦਾ ਹੈ।

ਟੀਟ ਲੇਸਰੇਸ਼ਨ ਨੂੰ ਇੱਕ ਐਮਰਜੈਂਸੀ ਸਥਿਤੀ ਮੰਨਿਆ ਜਾਂਦਾ ਹੈ ਕਿਉਂਕਿ ਇਲਾਜ ਵਿੱਚ ਕੋਈ ਦੇਰੀ ਮਾਸਟਾਈਟਸ ਜਾਂ ਅਜਿਹੇ ਟੀਟ ਦੇ ਨੈਕਰੋਸਿਸ ਦਾ ਕਾਰਨ ਬਣ ਸਕਦੀ ਹੈ (ਸਿੰਘ ਐਟ ਅਲ., 2003)। ਗੰਦਗੀ ਅਤੇ ਸੋਜਸ਼ ਨੂੰ ਘੱਟ ਕਰਨ ਲਈ ਜਿੰਨੀ ਜਲਦੀ ਹੋ ਸਕੇ ਸੱਟ ਲੱਗੇ ਹੋਏ ਟੀਟ ਨੂੰ ਸਾਫ਼ ਕਰਕੇ ਪੱਟੀਆਂ ਨਾਲ ਬੰਨ੍ਹਣਾ ਚਾਹੀਦਾ ਹੈ।ਲੇਸਰੇਸ਼ਨ ਦਾ ਪਤਾ ਲੱਗਣ ਤੋਂ ਬਾਅਦ ਪਸ਼ੂ ਪਾਲਕਾਂ ਨੂੰ ਤੁਰੰਤ ਆਪਣੇ ਵੈਟਰਨਰੀ ਸਰਜਨ ਨਾਲ ਸੰਪਰਕ ਕਰਨ ਦੀ ਸਲਾਹ ਦਿੱਤੀ ਜਾਣੀ ਚਾਹੀਦੀ ਹੈ। ਟੀਟ ਲੇਸਰੇਸ਼ਨ ਦੀ ਸਫਲ ਮੁਰੰਮਤ ਸ਼ੁਰੂਆਤੀ ਇਲਾਜ 'ਤੇ ਨਿਰਭਰ ਕਰਦੀ ਹੈ। ਹਾਈਡਰੋਥੈਰੇਪੀ, ਆਈਸ ਥੈਰੇਪੀ ਜਾਂ ਨਿਰੰਤਰ ਪਾਣੀ ਦੀ ਵਰਤੋਂ (ਬ੍ਰੋਏਰਟਸ ਓਨਦ ਵਿਸਹਚਿਕ, 2010) ਅਪ੍ਰੇਸ਼ਨ ਤੋਂ ਪਹਿਲਾਂ ਸਾਈਟ 'ਤੇ ਸੋਜ ਅਤੇ ਗੰਦਗੀ ਨੂੰ ਘਟਾਉਣ ਵਿੱਚ ਮਦਦ ਕਰੇਗੀ।ਗੰਭੀਰ ਜਾਂ ਗੈਂਗਰੇਨਸ ਮਾਸਟਾਈਟਸ ਦੇ ਕੇਸਾਂ ਲਈ ਟੀਟ ਕੱਟਣ ਦੀ ਲੋੜ ਹੁੰਦੀ ਹੈ।

ਸਿਰਫ ਚਮੜੀ, ਜਾਂ ਚਮੜੀ ਅਤੇ ਖੋਖਲੀਆਂ ਮਾਸਪੇਸ਼ੀਆਂ ਦੇ ਸਤਹੀ ਜਖਮਾਂ ਦਾ ਪਤਾ ਉਹਨਾਂ ਦੀ ਦਿੱਖ ਅਤੇ ਟੀਟ ਨਹਿਰ ਤੋਂ ਦੁੱਧ ਦੇ ਲੀਕ ਹੋਣ ਦੀ ਅਣਹੋਂਦ ਦੁਆਰਾ ਕੀਤਾ ਜਾਂਦਾ ਹੈ। ਉਹਨਾਂ ਦਾ ਇਲਾਜ ਸਿਰਫ਼ ਟੀਟ ਪੱਟੀ ਲਗਾ ਕੇ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਪੱਟੀ ਲਗਾਉਣ ਤੋਂ ਪਹਿਲਾਂ ਜ਼ਖ਼ਮ ਨੂੰ ਚੰਗੀ ਤਰ੍ਹਾਂ ਸਾਫ਼ ਅਤੇ ਸੁੱਕਣਾ ਚਾਹੀਦਾ ਹੈ। ਪੱਟੀ ਜ਼ਖ਼ਮ ਨੂੰ ਹੋਰ ਸੱਟ ਅਤੇ ਲਾਗ ਤੋਂ ਬਚਾਉਂਦੀ ਹੈ ਅਤੇ ਇਸ ਨੂੰ ਆਸਾਨੀ ਨਾਲ ਬਦਲਿਆ ਜਾ ਸਕਦਾ ਹੈ ਜੇਕਰ ਇਹ ਦੂਸ਼ਿਤ ਹੋ ਜਾਂਦੀ ਹੈ।

ਟੀਟ ਦੀ ਸਰਵੋਤਮ ਮੁਰੰਮਤ ਨੂੰ ਪ੍ਰਾਪਤ ਕਰਨ ਲਈ, ਆਮ ਤੌਰ 'ਤੇ ਐਮਰਜੈਂਸੀ ਦੇ ਰੂਪ ਵਿੱਚ ਪੇਸ਼ਕਾਰੀ ਦੇ ਸਮੇਂ ਜ਼ਖਮਾਂ ਨਾਲ ਨਜਿੱਠਿਆ ਜਾਂਦਾ ਹੈ। ਟੀਟ ਨਹਿਰ ਵਿੱਚ ਡੂੰਘੇ ਜ਼ਖਮਾਂ ਦੇ ਨਤੀਜੇ ਵਜੋਂ ਸਾਈਨਸ ਬਣ ਸਕਦਾ ਹੈ ਅਤੇ ਤੁਰੰਤ ਸਰਜਰੀ ਦੀ ਲੋੜ ਹੁੰਦੀ ਹੈ (ਰਾਬਰਟਸ ਅਤੇ ਫਿਸ਼ਵਿਕ, 2010)। ਟੀਟ ਦੇ ਸਰਜੀਕਲ ਪ੍ਰਭਾਵ ਖਾਸ ਤੌਰ 'ਤੇ ਉੱਚ ਝਾੜ ਵਾਲੀਆਂ ਗਾਵਾਂ ਵਿੱਚ ਆਰਥਿਕ ਮਹੱਤਤਾ ਰੱਖਦੇ ਹਨ। ਜ਼ਿਆਦਾਤਰ ਮਾਮਲਿਆਂ ਵਿੱਚ, ਟੀਟ ਦੇ ਟੁੱਟਣ ਦਾ ਪੁਨਰ ਨਿਰਮਾਣ ਸਰਜਰੀ ਦੁਆਰਾ ਸਫਲਤਾਪੂਰਵਕ ਇਲਾਜ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਟੀਟ 'ਤੇ ਸਰਜੀਕਲ ਦਖਲਅੰਦਾਜ਼ੀ ਪਹਿਲੇ 12 ਘੰਟਿਆਂ ਦੌਰਾਨ ਸਭ ਤੋਂ ਵਧੀਆ ਢੰਗ ਨਾਲ ਕੀਤੀ ਜਾਂਦੀ ਹੈ (ਪੱਲਬ ਐਟ ਅਲ., 2021)। ਹਾਲਾਂਕਿ, ਟਾਂਕੇ ਲਾਉਣ ਤੋਂ ਬਾਅਦ ਟੀਟ ਨਹਿਰ ਦਾ ਚਿਪਕਣਾ ਇੱਕ ਆਮ ਪੇਚੀਦਗੀ ਹੈ ਅਤੇ ਇਲਾਜ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿੱਚ ਦੇਰੀ ਹੁੰਦੀ ਹੈ। ਮੁਰੰਮਤ ਦੀ ਮਹੱਤਵਪੂਰਨ ਗੁੰਜਾਇਸ਼ ਹੈ ਅਤੇ ਇਸ ਨਾਲ ਪਸ਼ੂਆਂ ਨੂੰ ਲੰਬੇ ਸਮੇਂ ਤੱਕ ਦੁੱਧ ਦੇ ਉਤਪਾਦਨ ਵਿੱਚ ਸੰਭਾਲਣ ਵਿੱਚ ਮਦਦ ਮਿਲ ਸਕਦੀ ਹੈ।



ਪੂਰਵ-ਅਨੁਮਾਨ ਚਾਰ ਘੰਟਿਆਂ ਤੋਂ ਵੱਧ ਪੁਰਾਣੇ ਜ਼ਖਮਾਂ ਵਿੱਚ ਵਿਗੜ ਜਾਂਦਾ ਹੈ ਅਤੇ 12 ਘੰਟਿਆਂ ਬਾਅਦ ਬਹੁਤ ਮਾੜਾ ਹੁੰਦਾ ਹੈ। ਟੀਟ ਦੀ ਨੀਂਹ ਦੇ ਨੇੜੇ ਦੇ ਜ਼ਖਮ ਦੂਰ ਦੇ ਸਿਰੇ ਵਾਲੇ ਹਿੱਸੇ ਨਾਲੋਂ ਬਿਹਤਰ ਹੁੰਦੇ ਹਨ, ਅਤੇ ਲੰਬਕਾਰੀ ਜ਼ਖਮ ਬਿਹਤਰ ਠੀਕ ਹੁੰਦੇ ਹਨ; ਇਹ ਮੁੱਖ ਤੌਰ 'ਤੇ ਲੇਵੇ ਅਤੇ ਟੀਟ ਨੂੰ ਖੂਨ ਦੀ ਸਪਲਾਈ ਕਰਨ ਦੇ ਤਰੀਕੇ ਦੇ ਕਾਰਨ ਹੈ (ਰਾਬਰਟਸ ਅਤੇ ਫਿਸ਼ਵਿਕ, 2010)। ਟੀਟ ਸਪਿੰਕਟਰ ਅਤੇ ਸਟ੍ਰੀਕ ਨਹਿਰ ਦੀ ਮੁਰੰਮਤ ਕਰਨਾ ਮੁਸ਼ਕਲ ਹੈ ਅਤੇ ਇਸ ਲਈ ਪੂਰਵ-ਅਨੁਮਾਨ ਮਾੜਾ ਹੈ।

ਸਰਜਰੀ ਤੋਂ ਬਾਅਦ ਵਿਗਾੜ ਵਿੱਚ ਪ੍ਰਣਾਲੀਗਤ ਅਤੇ ਅੰਦਰੂਨੀ ਐਂਟੀਬੈਕਟੀਰੀਅਲ/ਐਂਟੀਬਾਇਓਟਿਕ ਦਵਾਈਆਂ ਦਿੱਤੀਆਂ ਜਾਣੀਆਂ ਚਾਹੀਦੀਆਂ ਹਨ। ਜਦੋਂ ਤੱਕ ਫਾਈਬ੍ਰੀਨ ਸੀਲ ਨਹੀਂ ਬਣ ਜਾਂਦੀ, ਆਮ ਤੌਰ 'ਤੇ 6 ਘੰਟਿਆਂ ਵਿੱਚ ਥਣਾਂ ਵਿੱਚੋਂ ਦੁੱਧ ਨਹੀਂ ਚੋਣਾ ਚਾਹੀਦਾ। ਇਸ ਤੋਂ ਬਾਅਦ ਵਾਰ-ਵਾਰ ਦੁੱਧ ਚੋਣਾ ਸੋਜ ਨੂੰ ਘੱਟ ਕਰਨ ਲਈ ਫਾਇਦੇਮੰਦ ਹੁੰਦਾ ਹੈ। ਘੱਟੋ-ਘੱਟ 24 ਘੰਟਿਆਂ ਲਈ ਹੱਥਾਂ ਨਾਲ ਲਾਹਣ ਅਤੇ ਹੱਥ ਨਾਲ ਦੁੱਧ ਕੱਢਣ ਤੋਂ ਬਚੋ। ਜੇ ਸੋਜ ਜ਼ਿਆਦਾ ਗੰਭੀਰ ਨਹੀਂ ਹੈ ਤਾਂ ਮਸ਼ੀਨ ਨਾਲ ਮਿਲਕਿੰਗ ਸੱਟ ਦੀ ਸਰਜੀਕਲ ਮੁਰੰਮਤ ਤੋਂ ਬਾਅਦ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ। ਹੱਥਾਂ ਨਾਲ ਦੁੱਧ ਚੋਣ ਨਾਲ ਪੈਦਾ ਹੋਏ ਅਸਧਾਰਨ ਦਬਾਅ ਕਾਰਨ ਇਹ ਜ਼ਖ਼ਮ ਭਰਨ ਲਈ ਨੁਕਸਾਨਦੇਹ ਪਾਇਆ ਗਿਆ ਹੈ (ਰਾਬਰਟਸ ਐਂਡ ਫਿਸ਼ਵਿਕ, 2010)। ਜਖਮ ਨੂੰ ਪੂਰੀ ਤਰ੍ਹਾਂ ਠੀਕ ਹੋਣ ਤੱਕ, ਟੀਟ ਪੱਟੀ ਦੀ ਵਰਤੋਂ ਕਰਕੇ ਸੁਰੱਖਿਅਤ ਕੀਤਾ ਜਾਣਾ ਚਾਹੀਦਾ ਹੈ। ਸਰਜਰੀ ਤੋਂ ਬਾਅਦ ਤਿਮਾਹੀ ਵਿੱਚ ਦੁੱਧ ਦੀ ਮੌਜੂਦਗੀ ਅਤੇ ਸੁਕਾਉਣ ਦੀ ਸੌਖ ਸਫਲ ਸਰਜਰੀ ਨੂੰ ਦਰਸਾਉਂਦੀ ਹੈ।

ਪਸ਼ੂ ਪਾਲਕ ਪਸ਼ੂ ਦੇ ਲੇਵੇ ਅਤੇ ਲੇਵੇ ਦੀ ਸਿਹਤ ਨੂੰ ਬਣਾਈ ਰੱਖਣ ਵਿੱਚ ਮਹੱਤਵਪੂਰਨ ਭੂਮਿਕਾ ਨਿਭਾਉਂਦੇ ਹਨ। ਟੀਟ ਦੇ ਸਦਮੇ ਨਾਲ ਨਜਿੱਠਣ ਵੇਲੇ ਤੇਜ਼ ਅਤੇ ਪ੍ਰਭਾਵਸ਼ਾਲੀ ਸਰਜੀਕਲ ਦਖਲਅੰਦਾਜ਼ੀ ਸਫਲ ਨਤੀਜਾ ਪ੍ਰਦਾਨ ਕਰਦੀ ਹੈ। ਕਿਸਾਨਾਂ ਨੂੰ ਪਸ਼ੂ ਦੇ ਜ਼ਖਮੀ ਹੋਣ 'ਤੇ ਤੁਰੰਤ ਵੈਟਰਨਰੀ ਸਰਜਨ ਨਾਲ ਸੰਪਰਕ ਕਰਨ ਲਈ ਉਤਸ਼ਾਹਿਤ ਕੀਤਾ ਜਾਣਾ ਚਾਹੀਦਾ ਹੈ ਤਾਂ ਜੋ ਲੰਬੇ ਸਮੇਂ ਦੀ ਸਿਹਤ ਅਤੇ ਸਦਮੇ ਵਾਲੇ ਢਾਂਚੇ ਦੇ ਇਲਾਜ ਲਈ ਤੇਜ਼ੀ ਨਾਲ ਵਧੀਆ ਇਲਾਜ ਕੀਤਾ ਜਾ ਸਕੇ, ਕਿਸਾਨ ਦੇ ਆਰਥਿਕ ਨੁਕਸਾਨ ਨੂੰ ਰੋਕਿਆ ਜਾ ਸਕੇ ਅਤੇ ਪਸ਼ੂ ਦੇ ਉਤਪਾਦਕ ਜੀਵਨ ਨੂੰ ਵੱਧ ਤੋਂ ਵੱਧ ਬਣਾਇਆ ਜਾ ਸਕੇ।

Advanced Economic Feeding System to Enhance Milk Production

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Introduction

Small-scale dairy farmers in developing nations face several difficulties today, including high production costs, unstable markets, and low margins of profit. Farmers are also unable to choose the price for their agricultural products. Politicians and decision-makers in various regions of the country are in charge of the dairy cooperatives and are in charge of regulating the milk price. Therefore, rather of raising the price of their produce, farmers must employ scientific, cost-effective strategies to minimize production costs in order to make the dairy industry profitable. According to Dixit (2002), the average cost of producing milk in India is Rs. 30/litre. In addition to providing farmers Rs. 2.5 as an incentive for each liter of milk they produce, the state of Karnataka pays Rs. 32.5 per liter to the dairy cooperative that is effectively operating there, the Karnataka Milk Federation (KMF). In comparison, the gross value of milk sales in Karnataka is the lowest in the world at between 46 and 56 rupees. Farmers only make a very minimal profit margin.

The cost of buying animal stock, housing, maintenance, disease control, and feeding management are the main causes of the cost of milk production. Since feed prices alone represent 65-75% of regular costs on a dairy farm, improving cow productivity and efficiency through better nutrition can help the business become more profitable. Therefore, adjustments in feeding management and nutrition have the most potential in the shortest amount of time out of all the achievable ways in a dairy farming system to generate increased profits to the farmer. Therefore, the current discussion will provide a full overview of advanced, low-cost feeding technology that dairy producers might use for successful dairying.

The expense for producing milk:

Variation due to season, or variation in pricing of input like green feed, dry feed, and concentrate throughout the year, is one of the key factors that affects cost of production. Along with variations in agroclimatic conditions, the cost is also affected by the size of the enterprise, the breed of the animals, and the breeding, feeding, and management techniques employed.

According to research on the price of milk production reported by Dixit (2023), the price of milk production for native cattle varied from Rs. 28 to Rs. 32 per liter; for buffalo, it was Rs. 25 to Rs. 30 per liter; and for crossbred cattle, it was Rs. 18 to Rs. 20 per liter. Following manpower (20-25%) in terms of inputs, feed and fodder account for the majority of the total price of milk production (65-70%). Since the price of feed make up a significant portion of the gross production expenses, attempts to decrease the cost of milk production must concentrate on maximizing the efficiency of feed resources.

Advanced feeding strategies with affordable prices include:

- **Unconventional or recent feed resources:**

Numerous more recent feed sources are proven to be beneficial for feeding livestock. A reasonable alternative to fill the shortage as well as reduce production expenses is to replace some of the conventional feed sources. The regional suitability and availability of unconventional feed supplies are important determinants. Methods of processing and detoxification that are appropriate must be used. and utilized in animals at a safe inclusion level. Residues from agricultural crops are a novel source of feed that may be applied to feed livestock. India is the globe's second-largest producer of fruits and vegetables. During harvest, marketing, and processing, 33% of these are destroyed. The majority of these diets are affordable, healthy, and contain fewer ANFs. The primary challenge with employing these feed products is their high moisture content. However, they can be effectively used after being processed properly.

- **Techniques for adding minerals in feed:**

Every breed of animals need minerals for optimal well-being, growth, and milk production. The concentration of minerals in green fodder supplies is low and frequently requires supplementing, particularly for animals that produce an excessive amount of milk. Lack of minerals are especially difficult to identify because symptoms frequently appear after an extended period of underfeeding. Mineral deficiencies may interfere with growth and production in a subclinical behavior without revealing any symptoms. In spite of the fact that major nutrients must be provided in greater amount, minerals are also more economical than major nutrients. Therefore, for livestock that produce an abundance of milk, the right quantity of mineral supplementation is essential.

Mineral supplements involve:

a) Lick or the mineral block
b) The most popular method is mixing powder with concentrate feed
c) Supplemental liquids.

When contrasted with inorganic sources, chelated mineral sources are superior. In comparison to inorganic sources, they can be supplemented 50% less and have greater bioavailability and better absorption. Five to ten percent more minerals will have no effect, but giving too much can be hazardous and provide no further advantages. Some minerals should not be ingested in excess because they are unsuitable with one another. In an animal's diet, a two-to-one proportion of calcium to phosphorus is ideal. Milk fever tends to come caused by dairy cow diets with high Dietary Cation Anion Difference (DCAD) (alkaline diet).

The acidic diet, or low or negative DCAD, serves to prevent against milk fever. DCAD is decreased by consuming anionic salts (minerals abundant in Cl and S compared to Na and K) or minerals with acids. For optimum performance, a mineral mixture requires to contain both main and trace minerals in the right proportions.

- **TMR, or total mixed ration:**

Total mixed rations are "the practice of weighing and blending all feedstuff into an all-encompassing complete ration that offers sufficient nutrition to meet the dietary requirements of the cows that produce milk for one day". The amount of nutrients (fiber, energy, protein, minerals, and vitamins) that the animal needs is contained in every bite that it consumes. TMR features comprise : A 4-5% increase in feed intake, improved ruminal micro flora and environment, better formulation and feeding accuracy, and covering of the flavor of distasteful or nontraditional feeds (urea, limestone, fatty acids, and some bypass protein sources).It's important to avoid overmixing and undermixing the ingredients while merging all the feeds in a TMR. The TMR will cost slightly more than conventional mash feed, even if the benefits exceed the price. It is therefore an effective method that can minimize feed loss and promote feed efficiency in cows that produce milk.

- **Techniques for improving fodder employing crop residuals:**

Rice/paddy straw, wheat straw, and maize stover are among the most prevalent crop residues employed in the dairy industry. When used as fodder, these materials have little nutritional value and are rich in lignified fiber, resulting in them incapable to maintain the livestock productive for an extended period of time. As a result, straws or crop residues should only be used as a substitute type of feed that has been boosted with additional vital ingredients like urea, molasses, etc.

- **Storage and conservation of fodder:**

As agriculture in India heavily depends on the rainy season, a successful progressive dairy farmer always thinks about the future as well. A feed and fodder crisis might occur at any time of the season. During such an outbreak of limited supply, the expense of crop residue could increase, and the dairy sector would be impacted. During the rainfall of the monsoon period, there are plenty of green fodder supplies. Green feed that is in surplus should be preserved as hay or silage. Although India's tropical climate encourages conservation as hay, very few farmers are accepting this method of farming.

The production of silage is increasing in popularity, and more farmers who raise milk are utilizing this technology for supplying fresh feed during the year's periods of drought. The stover and straw frequently catch fire on the farms themselves. resulting in polluted environments, especially in Punjab and Haryana. Although their poor nutritional value, such dry agricultural leftovers can be stored with convenience. Employing techniques like urea ammoniation, treatment with alkali, or introducing molasses, these crop leftovers can be enhanced. Therefore, the most economical approach for both sustainability and earnings is to offer an adequate supply of high-quality fodder throughout the entire year.

- **Feeding on the basis of the animal's postpartum period:**

A dairy system for farming should maintain adequate feeding in order to avoid nutrient shortages or surplus. The dietary requirements of dairy cattle differ depending on their physiological stage and their level of production. To maximize milk production, reproduction, and dairy cow health, there are five distinctive feeding phases or stages that can be specified throughout the lactation phase of dairy cattle. Following this scientific feeding technique will result in cost-effective milk production.

- **Initial lactation:**

Postpartum, from 0 to 70 days (at its highest milk production). The milk supply increases over time all throughout this phase of lactation and maximum 6 to 8 weeks afterwards calving. Dry matter intake is insufficient for dairy cows to meet their dietary requirements for the production of milk. As a result, the body's fat stores are released to be used in the production of milk. Therefore, it is important to introduce the cow to highly energetic diet, which is an essential method of management during the early lactation phase. to enhance nutritional intake throughout the early stages of lactation. Feed forage of a superior grade. Permit continuous access to fodder. Consider about introducing rumen bypass fat in the diet. For appropriate CP, RDP, and UDP, optimize the diet.

- **Optimum DM utilization:**

Occurs 70 to 140 days (decreasing milk production) after delivery. Animals have an instinct for ingesting more dry content during this period. Allow the animals free access to feed and fodder. Since a drop in milk production is unavoidable, it should be limited and cows shouldn't be reducing bodyweight. Grain feeding can be enhanced for high-yielding dairy animals, but not over 2.5% of body weight. To achieve optimum rumen function and normal milk fat content, forage quality should be superb and intake of at least 1.5% of body weight is recommended. During this time, issues such as a sudden decrease in milk production, low fat and SNF challenges, silent heat, and hypoglycemia are possible. A scientific feeding strategy should work to minimize these risk factors.

- **Mid and post lactation:**

Postpartum 140 to 305 days (declining milk production). The cow may be pregnant throughout the period of lactation, and the feed DMI will quickly fulfill or exceed the animal's dietary needs. In combination feed mixture feeding should try to restore any reduction in body weight during the post-calving phase and be at a level suitable for milk production. Farmers can easily maintain livestock during this phase as there are just a few potential health issues.

- **Dry period:**

60 days prior to to the following lactation. Most farmers might not give the animals a long adequate dry period for recovery. For the necessary amount of colostrum to be produced and to prepare the cow for the following lactation, a minimum of 60 days is necessary during the dry stage. As a result, this is an essential phase in the lactation cycle that influences the lactation period that follows. It is advisable to provide low-quality forage, such as straw or grass hay, as opposed to limiting feeding.

An adequate quantity of the three vitamins A, D, and E must be included in the diet to increase calf survival, reduce the risk of retained placenta, and improve milk fever complications. The possibility of milk fever during this particular period is suggested to be avoided by using an anionic mineral mixture. Selenium along with other trace minerals should be appropriately supplied through the diet of dry cows.

- **Period of transition or close-up:**

14 days prior to the delivery. For adaptation of dry cows to lactation ration without causing metabolic disorders, a transitional or close-up dry cow feeding program must be implemented. Niacin and anionic salts supplementation is additionally suggested for reducing the risk of hypoglycemia and milk fever, respectively.

- **Specification for the least-cost ration:**

The most affordable and balanced ration within the given boundaries must be estimated (either by a veterinarian or an animal nutritionist), or it can be calculated via software based on the chemical composition of the local feed materials and the animal's dietary requirements. There are now frequently used smartphone applications available that farmers can use as well. As an instance, the ICAR-NIANP, Bengaluru, developed the Feed-assist software. Feeding costs can be decreased and the production of milk can be increased by employing the least expensive balanced ration that is designed according to animal demands with locally accessible feed resources.

Important factors to consider for profitable milking dairy cattle feeding are as follows:

- Scientifically balanced ration.
- The ideal roughage to concentration ratio for improved ruminal health is 60:40. If an animal generates a lot more milk and has enough fiber, the particle size may exceed 50:50. A ratio below this one could elevate the risk of ruminal acidosis and other digestive disorders.
- Allays provide high-quality feed that is free of mold and toxins to maximize the advantages of feed to the maximum.
- Animals are grouped nutritionally according to their physiological stages since the nutrients they require vary with each stage. Specifically, Calf, Heifer, Pregnant, Dry should be managed at the farm level and fed properly. Giving all the animals exactly the same quantity and quality of food could prepare animals for nutritional excess or scarcity.
- Throughout the entire day, provide access to clean water since it is both the most neglected and crucial element for animals.
- The feeding intervals: Feeding frequency should be optimized for the highest feed efficiency and the least amount of wastage. To meet their needs for dry matter, high yielding animals require more frequent feeding. Livestock require to be fed more frequently across the summer and throughout gestation, especially during the cooler times of each day. The efficiency of feed consumption enhances if the total feed to be provided in a day can be provided in more than one feeding. Therefore, high-producing livestock should be fed at least six times throughout the day with a sufficient amount of time for the animals to ruminate and rest in order to achieve maximum production

- **consumption of green fodder:**

Farmers found that keeping dairy cows on green fodder is the most cost-effective method since it costs around Rs. 2.5 and Rs. 3.0 per kilogram in India. Depending on the geographic area, the availability of land, water, labor, and other resources needed for growing green feed, the cost of production may vary. An animal requires, on average, 25 kg of green fodder daily. It is highly palatable, easily absorbed, and regarded as natural feed for milking cows, which aids in maintaining favorable rumen conditions. Pasture land, forest land, public land, or farmed fodder are every possible source of green fodder. Green feed obtained from pasture or grazing area is among the least economical of these natural assets.

Traditional systems of people who raise livestock frequently use grazing-based livestock management strategies, particularly in remote regions and close-by forested areas that significantly support livelihoods and environmental services. The most significant single source of feed for ruminants in these types of environments is pasture grasses. They serve as the majority of the animals' feed during the growing period at a price that is less than that of feeds. Farmers can grow high yielding green fodder varieties for profitable dairy production as a result of urbanization and declining grazing resources. By reducing the amount of concentrates fed to the animals, increased usage of green fodder in the animal's diet may lower the overall price of producing milk.

The biggest challenge is ensuring a constant supply of green fodder, which can be resolved through the implementation of good animal husbandry strategies.

- Grow perennial fodder plants including cowpea, lucerne, cluster beans, and velvet beans together with fodder legumes like sorghum, hybrid napier, and sorghum.
- Whenever feeding green feed to animals, chop them.
- Preserve extra green feed as hay or silage.
- Create a plan for tree forage, such as sesbania, moringa, subabul, etc.

- **Technology employed for precision feeding:**

The best nutritional fulfillment is one which enables an organism to fully benefit from genetics while preventing nutrition from growing an organism any larger than the maximum size determined by inheritance. Therefore, the best advantages offered by precision feeding should be employed for the economical feeding of animals in order to prevent overfeeding. Precision feeding technology ensures the most efficient and the most secure production of animal products, the best product quality, and at the same time the lowest level of environmental pollution by reducing elimination of unutilized nutrients. Precision feeding technology meets the nutrient requirements of the animals with the greatest degree of adequacy.

In order to preserve environmental and financial sustainability, precision feeding involves a continuous process of providing livestock appropriate but not excessive nutrition and obtaining the bulk of nutrients from domestic feeds through the integration of feeding and forage management. Reduced risk of over-conditioned livestock, lower feed costs, and less waste produced are a few advantages of precision feeding for the producer. When precise feeding is needed, major nutrients involve -

- **Energy:**

Given the fact that the consumption of other nutrients is impacted by the availability of energy, it is the most vital nutrient of all. Animals may get more energy from both fats and sugars. The primary source of energy in a typical dairy cow diet will be carbohydrates. Forage and concentrate feed ingredients should ideally be a source of slowly fermentable carbohydrates. Overfeeding the animal must be prevented in order to get the best outcomes for the economy. Another approach for providing animals energy is to bypass fat. In high-yielding animals during periods of transition and heat stress, bypass fat is recommended. It enhances energy density and improves dairy animals' negative energy balance.

In contrast to natural fatty acids, which have glycerol as their structural backbone, bypass fat is made up of calcium salts of fatty acids. When calcium is blended with fatty acids, a rumen-inert fat supplement is created that has a low solubility and is hence less exposed to microbial assaulting and biohydrogenation. In contrast to the acidic environment of the abomasum, it becomes hydrolyzed and releases calcium and free fatty acids for absorption. Early lactating animals should be given bypass fat during the summer to promote milk and fat production and ensure early conception. As an a dairy cow, 100-150 g of bypass fat per day is suggested.

- **Fiber aids in rumen health:**

An average dairy cow should consume about 2% of its body weight in forage dry matter. Out of this, the entire ration should contain at least 28-30% neutral detergent dietary fiber. It also known by the name "effective fiber" that require at least 2 kg of fiber every day. Rumen PH, which should be over 6.0, can be used to measure it. Fiber digestion and microbial protein production might be restricted by a lower PH. maintains the amount of butterfat in the milk, which is the primary criteria used by dairy cooperatives for purchasing milk. Utilizing fiber well additionally minimizes SARA (Sub Acute Rumen Acidosis), optimizing the performance of animals.

- **Protein:**

Since protein supplements are the most expensive components, they should be used judiciously nonetheless in an amount that will allow for optimal milk production. The cows who are lactating should receive a variety of protein sources rather than just one. The objective of a protein supplementation strategy should be to improve microbial protein production.

The following sources of protein can be given to ruminant animals via supplements:

- The optimal ratio of rumen degradable to undegradable protein sources is 60:40. This is known as rumen un-degradable protein (RUP).
- Providing rumen bypass protein will boost growth rate by 25-30% and milk yield by 10% while decreasing dietary amino acid loss as ammonia and urea and preserving energy through less urea synthesis. promote reproductive effectiveness. Rumen bypass protein feeding at a rate of 100-150g per day is excellent for transitional livestock and those who have excellent milk production.
- Lysine and methionine are believed to be limiting amino acids in a typical diet that consists of corn-and-soybean meal. When cattle are fed more CP than required to meet their demands for metabolizable amino acids, it leads to an excess of N that is eliminated in the urine and may negatively impact the environment. Total dietary CP may be reduced by adding RUP or the limiting essential amino acids in rumen-protected form to meals.
- NPN-Urea: Only Urea should be used to provide the remaining third of the body's protein needs. Urea should be released in a controlled manner for the ruminant to utilize it more efficiently. For improved microbial utilization, urea should be supplied in dairy cattle feed together with enough amounts of either starch, molasses, or cellulose and minerals like P, Co, and S.

It is possible for producing more N-efficient diets is improved by understanding or recognizing the degree of urea recycling and accounting for this as well as the microbial consumption of the recycled N. A dairy cow with a body weight between 300 and 600 kg should never have more than 80 to 160 grams of urea daily.

Overfeeding ruminant animals via protein will result in ammonia waste and increase expenses for feed since it exceeds what the ruminal bacteria can use for metabolizing it.

Conclusion:

A balanced diet enhances nutrient utilization by stabilizing ruminal fermentation. This feeding strategy is highly appreciated since it enables increased use of agro-industrial waste products, crop remaining food, and non-conventional feeds in ruminant rations for strengthening productivity and minimizing feeding expenditures. There cannot be a single perfect advancement in technology or scientific discovery that could satisfy all of the demands of agricultural producers or minimize the overall price of production. The entire expense of technologies for both consumers and farmers must be taken into account. Innovations must be convenient to utilize, affordable, upgradable, accessible, and readily available domestically. Changes in feeding management and nutrition have the most potential in the shortest possible period of time out of all of the possibilities in a dairy system of production to promote a higher return to the producer.

Gut Microbiota and Nutrient Metabolism Interaction in Livestock

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Gut microbiota

The GI-tract and its microbiota represent a very complex ecosystem. The gastrointestinal microbiota of monogastrics is composed primarily of bacteria, and particularly anaerobic Gram-positive bacteria. The intestinal bacteria make important contributions to host metabolism and physiology. The relationship between host and microbiota in a healthy individual is a homeostatic symbiosis that primarily involves nutrient acquisition. But, beyond digestion, GIT microbes potentially contribute to the overall health status of the host. The commensal bacteria alert the immune system and allow the host to distinguish between commensal and pathogenic bacteria. The dynamic interactions and overall composition of the microbial community in the gastrointestinal tract of animals and humans ultimately reflect the co-evolution of microorganism with their host and the environments, and diets adopted by the host. Due to the impact on nutritional, physiological, and immunological processes, the microbial community of the gut markedly influences health and performance of the host. The intestinal epithelium has the capacity to ensure optimal absorption of nutrients, simultaneously it exclude and neutralize or detoxify pathogenic microbes. This epithelial function is influenced by direct host/microbiota interactions, and through microbial activities on the diet, accordingly, a microbiota ensuring the best possible operation of the epithelium may be considered advantageous.

The dietary components affect intestinal microbiota of the host. Both domestic cats and dogs are members of Carnivora, but their intestinal microbial diversity varies to some extent. In felines, Firmicutes have been shown to be the most predominant bacterial group, followed by Proteobacteria, Bacteroidetes, Fusobacteria, and Actinobacteria respectively. The predominant phylum of dogs, humans and mice are Fusobacteria and that dogs have a relatively greater percentage of Firmicutes. Among the groups of archaea, the methanogenic archaea were also the most abundant group in dogs, human, mice and chicken.

Microbiota and nutrient metabolism

Microbiota and carbohydrate metabolism

The sophisticated relationship between the GI tract and gut microbes allows for efficient use of dietary carbohydrates. The monogastrics and humans can adsorb monosaccharides (eg. glucose and galactose) in the small intestine, and can also hydrolyze certain disaccharides such as sucrose and lactose to their constituent monosaccharides. However, they have limited enzymatic ability to degrade complex polysaccharides from the diet. Therefore, simple sugars are absorbed in the proximal small intestine by active transport, and undigested dietary polysaccharides enter into the distal small intestine and colon, where they are degraded by microbial action. The degradation of these undigested dietary polysaccharides is a fermentation process involving numerous gut microbes, including Bacteroides, Bifidobacterium, Ruminococcus, and Roseburia spp., as well as some microbes from Clostridium, Eubacterium, and Enterococcus genera. The major end products of polysaccharide fermentation are SCFA i.e. acetate, propionate, and butyrate, which provide energy for the host and are involved in a number of physiological functions. These SCFAs can be used as the energy source for epithelial cells or peripheral tissues. The SCFAs stimulate the colonic sodium and fluid absorption, modify the microbial composition, and regulate the glucose and energy homeostasis. Acetate and propionate can be taken up by the liver and be used as substrates for liver cholesterol and fatty acid biosynthesis; propionate can also act as a substrate for gluconeogenesis. Butyrate has been shown to improve insulin sensitivity, and modulate immune responses by macrophages.

Microbiota and protein metabolism

The gut microbes can affect nitrogen balance by de novo synthesis of amino acids and intestinal urea recycling. The gut microbes contribute to the circulating pool of essential amino acids. It has been stated that up to 20% of circulating lysine and threonine in nonruminant mammals, including adult humans, is synthesized by gut microbes. The intestinal microbiota also contributes to nitrogen balance by participating in urea nitrogen salvaging (UNS). Increased urease expression in gut microbes results in metabolism of urea in the GI tract into ammonia and carbon dioxide. Some of the ammonia can be used for microbial synthesis of amino acids. Perhaps more importantly, the nitrogen generated during this process (urea nitrogen) can re-enter the host circulation and serve as a substrate for synthetic processes. Reduced urea recycling has been reported in germ free animals and in humans receiving antibiotic therapy.

Microbiota and lipid metabolism

Triglycerides are a prominent source of energy during critical illness. Their body supply is tightly linked to the intestinal microbiota. The conventionalization of adult germ-free (GF) mice with a normal microbiota harvested from the distal intestine (caecum) of conventionally raised animals produces a 60% increase in body fat content and insulin resistance within 14 days despite reduced food intake. This has been attributed to microbiota that promotes absorption of monosaccharides from the gut lumen, with resulting induction of de novo hepatic lipogenesis. Colonization of GF mice with just a single gut microbe (B. thetaiotaocmicron) significantly increases total body fat content, although the increase in fat content was less than that seen with transfer of the complete mouse microbiota. In addition, microbiota stimulates increased hepatic triglyceride production and promotes storage of adipocyte triglycerides by suppressing the activity of a circulating inhibitor of lipoprotein lipase.

Microbiota and Vitamins

The intestinal gut microbiota also acts as an important supplier of various vitamins. Several common bacterial genera in the distal intestine (eg, Bacteroides, Bifidobacterium, and Enterococcus) are known to synthesize vitamins. Thiamine, folate, biotin, riboflavin, and panthothenic acid are water-soluble vitamins that are plentiful in the diet, but that are also synthesized by gut bacteria. Similarly, it has been stated that up to half of the daily vitamin K requirement is provided by gut bacteria. The molecular structure of bacterially synthesized vitamins is not always identical to the dietary forms of the vitamins. The Bifidobacterium and Lactobacillus spp. have been verified to have folate biosynthetic properties; Lactobacillus reuteri also has the ability to produce cobalamin (vitamin B_{12}). Several specialized epithelial transporters have been recognized to participate specifically in the absorption of vitamins derived from gut bacteria.

Conclusion

Gut microbiota should be considered a key aspect in animal nutrition. It influences many areas of animal health from innate immunity to appetite and nutrient metabolism.


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BRINGING PROGRESS TO FARMERS FOR BETTER EARNINGS

De Heus from the Netherlands to Construct Rs. 142 Crore Plant in Rajpura, Punjab, Bringing Quality Animal Feed & Best Farm Practices to Farmers

Farmers in Punjab and Haryana, who are unable to earn a decent living from the cultivation of traditional crops, are looking for avenues to diversify their crops, or shift to horticulture, dairy, poultry, fishery and piggery, etc. for better earnings.

De Heus, a top 10 global animal feed company from The Netherlands, Northwestern Europe, brings hope to such farmers by setting up Rs 142 crore state-of-the-art plant in Rajpura, Punjab to produce quality animal feed, and bring best farm practices to help them increase their earnings. This is the first major investment by a Dutch company in Punjab. The Netherlands is known to be the 2nd largest exporter of agricultural products in the world.

The plant, being set up by **De Heus India**, a direct wholly owned subsidiary of the **more than 100 years old De Heus** (with a global turnover of 7 billion euros in 2022), will produce a full livestock product portfolio of compound feed, concentrates, base mix and dairy mineral mixes. In the first phase, to be realized in first quarter of 2025, the plant will produce 180 kilo metric tons (kMT) of animal feed, with a potential to increase it to 240 kMT. The factory will have two dedicated lines.

Hon. Chief Minister of Punjab Mr. Bhagwant Mann was Chief Guest in the groundbreaking ceremony of the company's animal feed factory at Vividha Industrial Park, Rajpura on October 1, 2023. Ambassador of the Kingdom of the Netherlands to India, Nepal & Bhutan H.E. Marisa Gerards was the Guest of Honour.

Ambassador of the Kingdom of the Netherlands to India, Nepal & Bhutan H.E. Marisa Gerards

Addressing a press conference on 30 September to announce the investment in Punjab, **Rutger Oudejans, Business Group Director (Premix & Specialisties) and Country Director India; Tanveer Malik, General Director India**; and Amit Mittan, Commercial Director, De Heus India, said, "As a global leading supplier of nutritional products for animals, De Heus supports the performance of farmers - the producers of milk, eggs, fish and meat. It provides them not only with high quality products, but also with in-depth knowledge about animal nutrition, animal husbandry and animal science. We provide them with nutritional concepts that ensure maximum animal health and optimal performance for better earnings."

Rutger Oudejans, Business Group Director and Country Director India

Hon. Chief Minister of Punjab Mr. Bhagwant Mann

Tanveer Malik General Director, India

Amit Mittan, Commercial Director, De Heus

On advancing De Heus' footprint in the country, **Koen De Heus, CEO of the company, said in a message**, "India is an important market where we see a valuable role for De Heus, bringing advancement to farmers and local communities, having a positive impact on sustainable farming practices, increasing job opportunities and working in partnerships with local suppliers and partners, in short, powering progress. This is part of the company's global expansion strategy, aimed at building a local presence to optimally serve farmers with high quality animal feeds and practical farming advice."

Koen De Heus, CEO of the De Heus

In another message, De Heus's Asia division CEO Gabor Fluit said, De Heus has more than 60 own production locations in over 20 countries, and exports to more than 50 countries in Europe, Asia, Middle East, Africa and Latin America. "Wherever we operate, we dedicate ourselves to bringing prosperity to our customers along the entire value chain, from the farmers, to local communities and our marketing network."

Focusing on Punjab and Haryana, **Country Director India Rutger Oudejans said**, "during our six years presence in this region, producing animal feeds on rented feed mills, we have fully realized the great potential of the two states in driving accelerated growth in the areas of animal husbandry and livestock.

While Punjab is the dairy region in India with over 3000 commercial dairy farms, Haryana is a key poultry region exporting broilers and eggs to nearby states. Both states are rich in raw materials used in production of animal feed, with multiple crops per annum and a long tradition in farming. This is a great advantage for the company in delivering good quality feeds and ensuring their uninterrupted availability.

With its Dutch roots, and over 100 years history, De Heus has been a partner in animal nutrition to the agricultural sector for over four generations. Being a family owned and managed business (it is still owned by the De Heus family), it relates to, and bonds closely with its customers, which are also mostly family-owned businesses."

The support services of De Heus focus on:

- Providing accessible knowledge and experience about feed, animal husbandry and cattle farming
- Establishing the proper nutrient requirements and a feed strategy adapted to the local situation
- Keeping the animals and their offspring healthy
- Improving the productivity of the animals
- Increasing the production efficiency
- Improving the management processes on farms

Sustainable Animal Nutrition Solutions for a Changing World

A rapidly growing world population and rising living standards are putting increasing pressure on food value chains. For a sustainable food system, production must be optimised and made more accessible and responsible. As a leading supplier of animal nutrition solutions, De Heus helps farmers improve their performance, and deliver high-quality produce efficiently and responsibly.

Every day, we work towards creating better access to safe and healthy food for a growing world population. We do so by providing our customers with the products and services they need to look after their animals and manage the sustainable development of their businesses.

As well as high-quality feed, our specialists help drive efficiency and technological progress for our customers – by offering in-depth knowledge on animal nutrition and health, as well as animal husbandry and farming. We also work with farmers to improve their environmental footprint.


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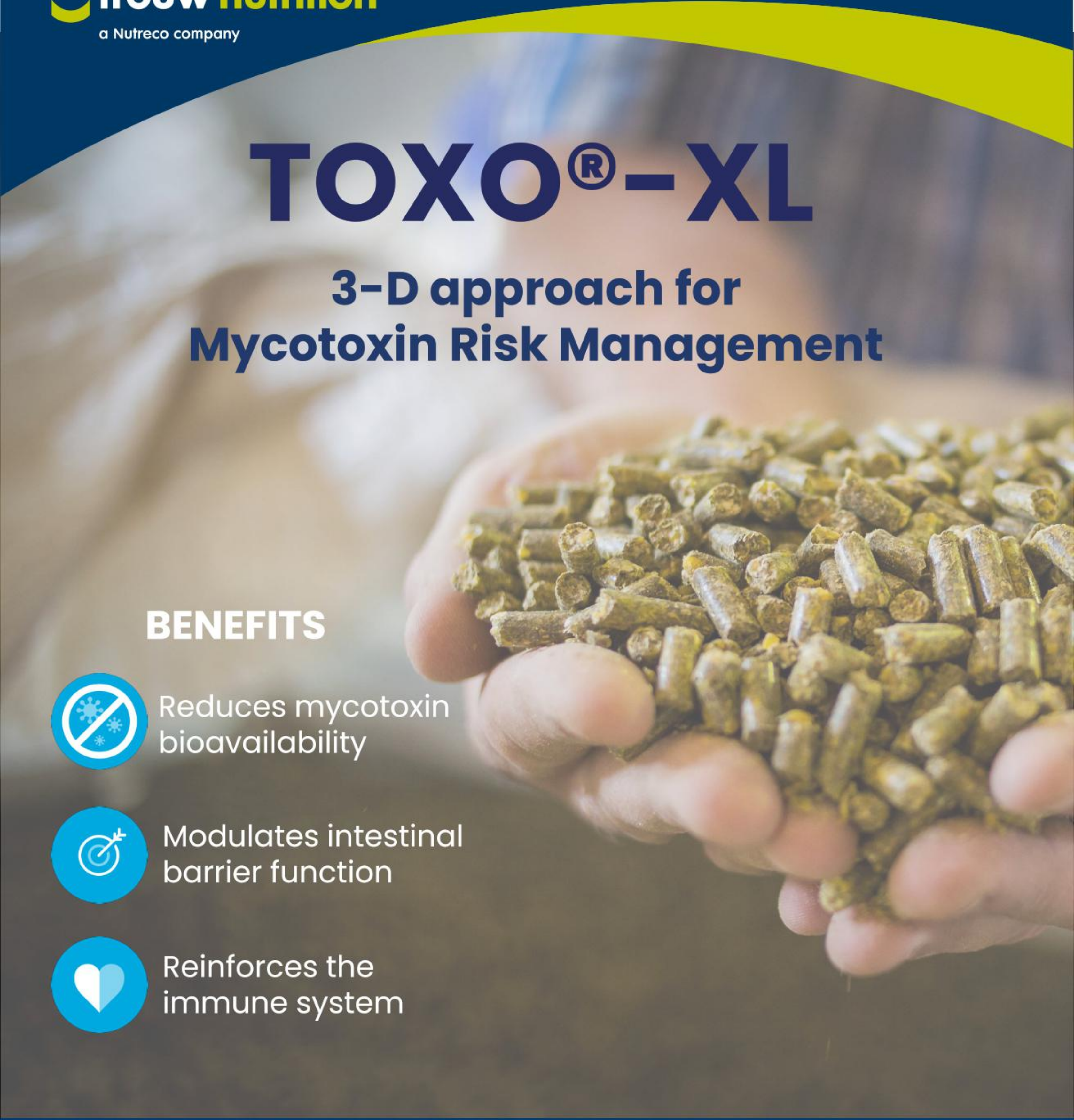

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Scientific Feeding of Transition Buffalo for Improved Production Performance

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India possesses 57% of the world's buffalo and 16% cattle, having 13% of the global livestock population (FAO, 2013). Buffalo is prominent in Haryana, Punjab, Gujarat, UP and AP, where it contributes between 54-85 per cent to total milk production and is important contributor to rural household incomes. Nutritional management during transition period is extremely important to achieve not only maximum milk but also reproduction from the ensuing lactation.

Transition period: In buffalo, transition period is the most important stage during which there is change from one state to another. The transition period is often considered from 3 weeks pre-partum to 3 weeks post-partum where buffalo transit from non-lactating state to lactating state. During this period many essential processes undergo within the body of dairy animals preparing for the next lactation. The dry period, and in particular the late dry period, should be considered a critical period in which the quality of all inputs will directly impact the productive performance in the next lactation as well as the incidence of disease associated with calving and buffalo health. Various physiological, metabolic and hormonal changes occur during the transition period for metabolic adaptations required for the growth of the foetus and onset of lactation. There is dramatic change in nutrient needs that necessitates coordination of metabolism to meet requirements for energy, glucose, amino acids and calcium by the mammary gland following calving.

Reduced feed Intake: The most important physiological changes are the reduction in dry matter intake (DMI) around parturition and increase in nutrient requirements for the rapidly growing foetus and milk production. However, the reduction in DMI varies with the breed of the animals, quality of ration, stage of lactation, parity, body condition score (BCS) of animals and also the environmental temperature. The DMI declines during the last 3 weeks of gestation and can be up to 30-35%, especially in subtropical area, where the summer temperatures usually reach 35°C during the day time. About 89% decline in DMI occurred at 5-7 days before calving in Holstein cows. Reduction in DMI in transition Murrah buffaloes was also reported which ultimately recovered after few days of parturition. These changes occurring in the transition buffaloes further modify her metabolism drastically. During the last trimester of pregnancy, the growing foetus occupies larger part of abdominal cavity which reduces the volume of rumen resulting in decreased DMI. Proper feeding management during this period regulates both milk production in the proceeding lactation as well as the reproductive efficiency of the animal.

Body condition score (BCS): Most of the dairy animals at the onset of lactation experience negative energy balance (NEB) due to reduced DMI and increased milk production. So, excessive mobilization of body lipid stores take place to support synthesis of milk and milk fat and increased amounts of non-esterified fatty acid (NEFA) are released into the circulation, the level of which increases gradually in the transition prepartum period, resulting reduced BCS, rumen fermentation and milk production. Dairy cows that are over conditioned (BCS>4.0), have a much greater reduction in their feed intake immediately pre-calving, compared with cows with a lower BCS.

Increased nutrient requirements: Parturition leads to an increased (2.8, 4.7 and 2.0 times more glucose, fatty acids and amino acids, respectively) demand of nutrient requirements by mammary gland especially for synthesis of milk lactose, fat and protein, which were at lesser need at prepartum for foetus. Therefore, there are challenges to the animal to meet these requirements. Immediately after calving, the demand of glucose for lactose synthesis increases to match the rapidly increasing milk production. In Holstein cows, the mammary requirement for energy was reported to increase three times at 4th day of lactation than that of the gravid uterus. The transition dairy animals suffer a NEB postpartum due to rapid increase in milk production which reaches its peak at 5-6 weeks, however feed intake continues to lower up to 12-14 weeks. The propionic acid produced in the rumen during the fermentation of dietary carbohydrates is the major precursor of glucose in the liver. In a study with Holstein cows, the foetus uses 46% of maternal glucose taken up by the uterus in the last weeks of foetal development. Glucose demand in Holstein cows has been estimated at 1000-1100 g/d during the last 21 days of gestation, but it increases sharply after calving to approximately 2500 g/day at 21d postpartum. Therefore, the shortfall of glucose requirement is covered from gluconeogenesis from body fat mobilization, muscle protein, amino acids, lactate and glycerol, subjecting the liver for a great challenge. The muscle protein mobilization increases threefold during the first week after calving compared with prepartum values; fat mobilization is 300%. Other body tissues also adapted to the reduced availability of energy. Glucose is also an important energy source for the ovary, and its reduced availability in the beginning of lactation can negatively impact the reestablishment of ovarian activity after calving, which affects the subsequent production. About 900g metabolizable protein (MP) is required per day during late pregnancy in Holstein cow and heifer. About 120 g MP/d is required for an increased synthesis of mammary tissue, resulting in an overall predicted requirement of between 1000 and 1100 g MP/d. Therefore, supplementation of dietary proteins especially rumen undegradable protein (UDP) is required to meet out these requirements. However, feeding of high protein with more degradability (RDP) could be detrimental to animal, and may result in decreased milk yield and delay in both follicular development and luteal function in cow. Feeding of excessive RDP also resulted in elevated blood urea nitrogen (BUN), and elevated milk urea nitrogen (MUN); affecting the uterine pH in heifers, which has been associated with reduced fertility.

The excess ammonia and elevated pH levels in the rumen causes Ca^{2+} and Mg^{2+} to form insoluble complexes with phosphorus making them unavailable for absorption encouraging both hypocalcaemia and hypomagnesaemia, which causes parturient paresis immediately after parturition in cows Existing feeding standards recommend additional allowance 20 and 10% of maintenance requirement, respectively for immature buffaloes in first and second lactation for maternal growth. Micronutrients viz. minerals and vitamins are essential for mammary gland development, growth of the developing foetus, and support of the antioxidative and immune functions. The mammary requirement for calcium to produce colostrum on the day of parturition is more than double than that for foetal growth in late gestation. The onset of lactation places such a large demand on mechanisms of calcium homeostasis that most cows develop some degree of hypocalcaemia at calving. In some cases, concentrations of plasma calcium become too low to support nerve and muscle function, resulting in parturient paresis or milk fever. Adaptations to increase the blood supply of calcium very soon after calving include increased intestinal active transport, increased resorption of bone stores and decreased urinary excretion of calcium.

Health disorders coupled to transition period: The transition changes favour the occurrence of health problems. The main disorders occurring during the transition period are fatty liver, ketosis, sub-acute and acute ruminal acidosis (disorders related to energy metabolism); milk fever, sub clinical hypocalcaemia, udder oedema (disorders related to mineral metabolism), abomasal displacement, metritis, and poor fertility which leads to major complicating factors for subsequent reproductive performance, resulting additional economic loss. Poor transitions also result in milk income losses through lowered peak yield. Moreover, the diet of most dairy animals changes sharply at calving from being mainly forage-based to concentrate-rich diets with high level of fermentable carbohydrates, the amount of VFAs produced exceeds the capacity of the rumen to absorb them, leading to decreased pH in the rumen environment. This situation leads to the phenomenon known as rumen acidosis and contributes to reduced DMI and feed digestibility in the early postpartum period. The increased level of NEFA (>0.3 meq/l) in the circulation due to NEB during the transition can be oxidized either completely to carbon dioxide to provide energy to the liver or incompletely, resulting in the formation of ketone bodies (>1200 µmol/l, BHBA concentration) causing a metabolic disorder, ketosis. The liver also re-esterifies NEFA into triacylglycerol (TAG). To release TAG from the liver, it is packaged into very low density lipoproteins (VLDL). Fatty liver develops when the liver uptake of lipids exceeds the oxidation and secretion of lipids by the liver. Excess lipids are stored as TAG in the liver and are associated with decreased metabolic functions of the liver. Raised blood ketones are associated with a 3-8 times increased risk of a displaced abomasums, double the risk of retained placenta, three times risk of metritis and six times increase in the risk of developing cystic ovaries. Subclinical ketosis causes reduction in milk yield, lowered fertility and longer to return to oestrus.

Nutritional strategies during transition period:

Improvement of voluntary intake: Maintenance of feed intake in transition buffalo, especially just after parturition is very important to minimise chance of health disorders and improvement in performance. The feed additives viz. yeast extracts and flavouring agents could be used to improve feed intake in ruminants. Recently, phytogenic substances such as essential oils, herbs, spices etc are being used to improve intake and milk production in bovines. Feeding of composite feed additive to lactating Murrah buffalo during 30d of lactation was reported to improve feed intake.

Dietary Energy-Protein Manipulation: Energy and protein are required for the maintenance, growth, and reproduction and production performance of animal. It is demonstrated that high fibre diet during the dry period decreases the size of the rumen papillae, which are responsible for the absorption of end products of digestion in the rumen. On the introduction of high energy diet after calving, the size of rumen papillae increases, resulting in higher and faster absorption of nutrients. But, if a diet rich in soluble carbohydrates and low in fibre is offered few days prior to calving, the desired papillae size can be achieved immediately after calving. The diet of such cows must provide the required 10 MJ ME/kg DMI with 16% CP. Daily requirement of ME (Mcal) of 29.76 and CP (g) of 1460 for buffalo having 500 kg BW with 10 litre (7% fat) of milk production has been reported. However, care should be taken to check excessive intake of high-energy diet in dry period, especially during last 3 weeks of gestation, to avoid peri parturient complications. Higher plane of nutrition during transition period was reported to improve body weight, parturition and expulsion of placenta with heavier birth weight of calf. Occurrence of 1st post-partum oestrous and conception were also reported better in crossbred cows fed higher plane of nutrition. Increasing energy density of diet by introduction of grains in the diet of transition cows and heifers at least 3-5 weeks prior to calving may stimulate rumen papillae growth and increase VFAs absorption from the rumen, adapt the microbial population to higher starch diets and increase feed intake. The energy density should be between 1.56 and 1.62 Mcal NEL/kg DM intake. It was demonstrated that when energy density of the diet increased from 1.3 to 1.54 Mcal NEL/kg DM and CP increased from 13 to 16% at about 3 weeks prior to calving, feed intake was increased by 30%. Increasing the energy and protein density up to 1.6 Mcal of NEL/kg and 16% CP in diets during the last month before parturition improved nutrient balance of cattle prepartum and decreases hepatic triglyceride content at parturition. Generally, the roughage to concentrate ratio recommended for high yielder is 50:50. But as the DMI is the major constraint, the alternative is either to increase the energy density (by feeding additional grains or adding oil seeds or protected fat) or by reducing roughage to concentrate (R:C) ratio. Formulation of any ration with density beyond 13 MJ ME/kg DM is quiet impossible. The total starch contents in the diet of high yielder should be between 20-25%. Molasses is an easily fermentable source of energy and included to increase the palatability as well as level of soluble sugars in the diet. The energy density of a ration can also be increased by dietary supplementation of oils and improve milk yield, fat per cent as well as birth weight of Murrah buffalo. But, addition of oils beyond 4% of total diet may adversely affect the feed intake and fibre digestion.

Buffaloes should be fed to support 750-900 g average daily weight gain during last 2 month of pregnancy and about 700g average daily weight gain during the last 3 month of pregnancy. In pregnancy of adult buffaloes, CP requirement increases by 3, 8.4, 16, 26, 43 and 64% of maintenance requirement on 5th, 6th, 7th, 8th, 9th and 10th month of pregnancy, respectively.

The corresponding increases in TDN requirements are 4.3, 7.2, 18.8, 22.2, 39.0 and 67.4% of maintenance requirement, respectively. Pregnant dry buffaloes (at >5 month of pregnancy) should be fed with 30 kg green fodder and 2 kg concentrate mixture (20% CP and 70% TDN) and ad libitum wheat straw. With decrease in availability of green fodder 1 kg concentrate mixture should be additionally fed to replace every 10 kg green fodder. This ration will meet protein requirement for entire pregnancy and energy requirement up to 9.5 month of pregnancy but will fall short of energy requirement on the last 2 weeks of pregnancy when additionally 1-1.5 kg grain has to be fed. For pregnant immature buffaloes, in additional 1 kg grain or 5.5 kg cereal fodder or 7.5 kg legume fodder should be fed to support 300-350 g average daily maternal growth. Similarly, buffaloes in their 2nd pregnancy should be fed additional 0.5 kg grain or 2.7 kg cereal fodder or 3.7 kg legume fodder to support 120-200 g average daily maternal growth. Challenge feeding of buffaloes with good quality fodder and concentrate mixture during last three weeks of pregnancy helps in priming the rumen for increased concentrate feeding in early lactation and build up body reserve for lactation. Dietary protein content and quality in terms of rumen degradability and amino acid composition is very important to meet the requirement of transition buffaloes. Natural protein supplement with high UDP content viz. corn gluten meal, cotton seed cake, coconut meal can be supplemented. Supplementation of condensed tannins (CT) through leaves of Artocarpus heterophyllus, Ficus infectoria, Ficus bengalensis and Ficus glomerata at 1.5-2.0% levels was observed to reduce the rumen degradability of groundnut cake to 60-75% from the normal value of 92%, demonstrating improvement of its utilization at lower digestive tract. Efficient utilization of protein supplements would not only improve the productivity and reproduction of the animal, but may also help in reducing the global warming by decreasing the enteric methane production especially from animals fed low quality roughages. The efficiency of rumen fermentation depends upon the amount of microbial biomass synthesized, which in turn depends on the synchronization of protein and carbohydrate breakdown.

Supplementation of bypass fat: High-yielding buffalo and crossbred cattle usually remain in negative energy balance during late gestation and early lactation due to energy deficiency. Under field conditions crossbred cow and buffalo often lose 75-90 kg BW after calving. Ovarian cycle ceases when buffalo loose 15-24% of BW. Such animals do not come in heat, unless the loss of BW is at least partially recovered. Fat plays an important role in the performance of lactating animals. Usually the extra energy required by the high yielding dairy buffaloes cannot be fulfilled by conventional ration. So, to increase the energy density of the ration, fats can be added. As fat degraded in the rumen may adversely affect the rumen microbes and feed intake; it should be given in rumen protected form. The level of total dietary fat in ration should not exceed 6-7% of diet. Mixture of cereal grains and forages usually contain about 3% fat, so up to 3 or 4% of dietary DM can come from supplemented fat. Inclusion of bypass fat up to 13% in the diet with continual increase in milk production in dairy Holstein cow has been reported. About 100-150g bypass fat/d could be supplemented to increase milk production performance in buffalo. Thus, supplementation of bypass fat in crossbred cows and Murrah buffaloes during the transition phase/early lactation improved the milk yield and fat content. Supplementation of bypass fat at 2.5% of DMI in multiparous crossbred cows from ?40 days to +90 days of parturition resulted an increase in birth weight of the calves, while time taken for expulsion of foetal membranes, involution of uterus, onset of cyclicity, service period and number of inseminations per conception were reduced ($P<0.05$). Supplementation of 15g bypass fat per kg milk yield increased milk fat and yield in buffalo, however, there was no effect on cyclicity and pregnancy rate.

Protected amino acids supplementation: Methionine (Met) and lysine (Lys) are the two most limiting amino acids for milk production. Dietary supplementation of Met and Lys (1:3) can be an effective approach to improve amino acid balance for milk production. Met also has an important role in the formation of very low density lipoproteins which are necessary for the export of stored fat in the liver and helps in preventing fatty liver. Met and Lys easily gets degraded in rumen. A source of ruminally-protected methionine (RPM) and lysine (RPL) are available commercially. Incorporation of 10g methionine and 30g lysine in the ration has improved milk production and milk composition of lactating buffalo. Choline, a component of phospholipid and methyl donor, plays an essential role in very low density lipoprotein synthesis and contributes to fat export from the liver. Choline is also required for biosynthesis and secretion of milk. Fat metabolism can be improved with the help of choline for better energy production which helps in improving milk production. As dietary choline is rapidly degraded in the rumen, it must be supplemented in rumen protected (RPC) form. Supplementation of 54g of RPC 40d before and 120d after calving improved milk yield and milk composition in dairy cattle. The combined effect of supplementing ration with RPM, RPL and RPC on the performance of preparturient crossbred cattle revealed improved BCS on the day of parturition, duodenal supply of Met and Lys, plasma TG, VLDL and phosphatidyl choline levels on the day of parturition in cows. Transition Murrah buffaloes fed basal diet (BD); BD+7g RPM+15g RPL; BD+50g RPC; BD+7g RPM+15g RPL+50 g RPC for a period from -3 months to + 3 months post partum, demonstrated that feed intake and BCS remained comparable among the buffaloes, however, milk fat per cent and 6% FCM yield were increased ($p<0.05$) in all supplemented animals.

Vitamins supplementation: Niacin supplementation is common in transition diets for its role in the prevention of ketosis through reduced body fat mobilization. Dietary 14g/d niacin supplementation was reported to increase milk production in early lactation of dairy cows. However, a meta-analysis of 27 feeding studies involving niacin supplementation to dairy rations showed no improvement in lactation performance when niacin was given at 6-12 g/d. Supplementation of niacin at high doses to the transition dairy cows has given inconsistent results. Biotin has a proven ability to stimulate glucose synthesis in the liver, which is the main energy source for milk production. The feeding of high concentrate diet during early lactation reduces rumen pH, which in turn decrease the biotin synthesis, leading to laminitis, which adversely affects milk production. The biotin supplementation demonstrated reduced claw lesions and also improved milk production and reproductive performance.

Buffers supplementation: Buffers combat acid production in the rumen and help to reduce digestive upsets or to maintain milk fat percentage when high grain diets are given to the lactating dairy animal to meet out energy deficiency.

A mixture of sodium bicarbonate and magnesium oxide (3:1) gives a better response than either fed alone. Buffers should be fed at the rate of 0.6 to 0.8% of DMI or 1.2 to 1.6% of concentrate mixture. Sodium or potassium buffers should not be fed during dry periods, because it elevates dietary cation-anion balance (DCAD) which predisposes the dairy buffalo to milk fever.

Rumen modifiers: Rumen modifiers act directly on rumen microbes, altering the microbial population balance and the proportions of volatile fatty acids (VFAs) produced. As such, they play a part in adapting the rumen. Ionophore rumen modifiers include sodium monensin and lasalocid. Antibiotic rumen modifiers include virginiamycin and tylosin. The effects of sodium monensin are primarily increased ruminal propionate balance, reflecting an increase in propionate producing bacteria compared to those producing formate, acetate, lactate and butyrate. The increase in both milk yield and milk production efficiency with decreased risk of ketosis, displaced abomasum, retained placenta and metritis was reported on supplementation of monensin to transition cows. Recently, various plant secondary metabolites are used to modify rumen environment to increase propionate production and reducing methanogenesis in the rumen. An increased milk production with sustained feed intake in early lactating buffalo fed a composite feed additive containing rumen stimulant and methane inhibitors at 30 days post-partum was reported.

Minerals supplementation: Buffalo milk is rich in calcium, phosphorus, potassium and magnesium. Most of the B-complex vitamins are present in milk. A marginal deficiency of the vitamins and minerals may not have significant impact on milk quantity and quality. However, calcium is one of the crucial elements in the ration to be considered more carefully in transition buffalo. At the beginning of lactation, the sudden demand of calcium for milk production increases dramatically, leading to fall in blood calcium levels resulting in hypocalcaemia. This stimulates the secretion of parathyroid hormone (PTH), which stimulates the bone resorption. It takes 2-3 days for the PTH cycle to become fully functional. It also activates vitamin D3, which increases absorption of Ca from intestine and mobilized bone Ca. But this process requires 24-48 h, and cannot prevent animal from milk fever/parturient paresis as more than 60% of cases of milk fever occur within 24 h of parturition. To avoid incidences of milk fever, the best feeding management practice is to provide low Ca (<50g/day) diet during last 2-3 weeks of gestation, which should be increased to about 100g/d at least two days before parturition. The diet, after parturition, should have sufficient Mg, an essential activator of vitamin D3 in liver. An optimum requirement of Ca and P by 0.53 and 0.34%, respectively in the total dry matter intake in buffalo was reported. Buffalo milk contains about 1.8-02.0g Ca and 1.1-1.2g P per kg milk. Daily requirement of Ca is at around 5.2-5.8g and of P is 2.1-2.3g for per kg milk production. Good quality mineral mixture should be supplemented (50- 60 g/d) to buffalo for proper foetal growth and milk production.

Dietary cation-anion difference (DCAD): DCAD refers to the numerical difference between the sum of certain dietary cations (positively charged minerals) and certain dietary anions. Primarily, the cations to consider are sodium (Na) and potassium (K) while the anions are chloride (Cl) and sulphur (S). Reducing DCAD in the prepartum transition period dramatically reduced the risk for milk fever and subclinical hypocalcaemia by improving calcium dynamics for the buffalo. A diet having 330 mEq/kg DM DCAD has promoted feed consumption, water intake and resulted in greater milk yield and milk fat in early lactating buffalo and occurrence of hypocalcaemia was reduced by feeding diet containing -110 DCAD level, for last four to six weeks before parturition. Feeding of 90g anion salt (-749 mEq) from -21 days up to calving and 125g cation salt (Sodi bicarb., +1473 mEq) up to 21d postpartum improved milk yield and fat per cent in Murrah buffaloes with simultaneous improvement in reproductive health of animals. Provision of adequate quantity and quality nutrients as required by buffaloes during the transition period generates positive effects on animal health; milk and reproductive performance.

Nutrition of transition buffalo plays an important role in improving production and reproduction performance not only in the current lactation but also in the ensuing lactation. Reduced dry matter intake during transition period is the main factor for depressed performance of buffalo. Estimates of the demand for glucose, amino acid, fatty acids, and net energy by the gravid uterus at three weeks prepartum and the lactating mammary gland at postpartum indicated approximately a tripling of demand for glucose, doubling of demand for amino acids, a five fold increase in fatty acids and four fold increase in calcium. Therefore, proper feeding management should be practiced to fulfil nutrient requirement for improved production and reproduction performance of buffalo.

EVENT CALENDER

NOVEMBER 2023

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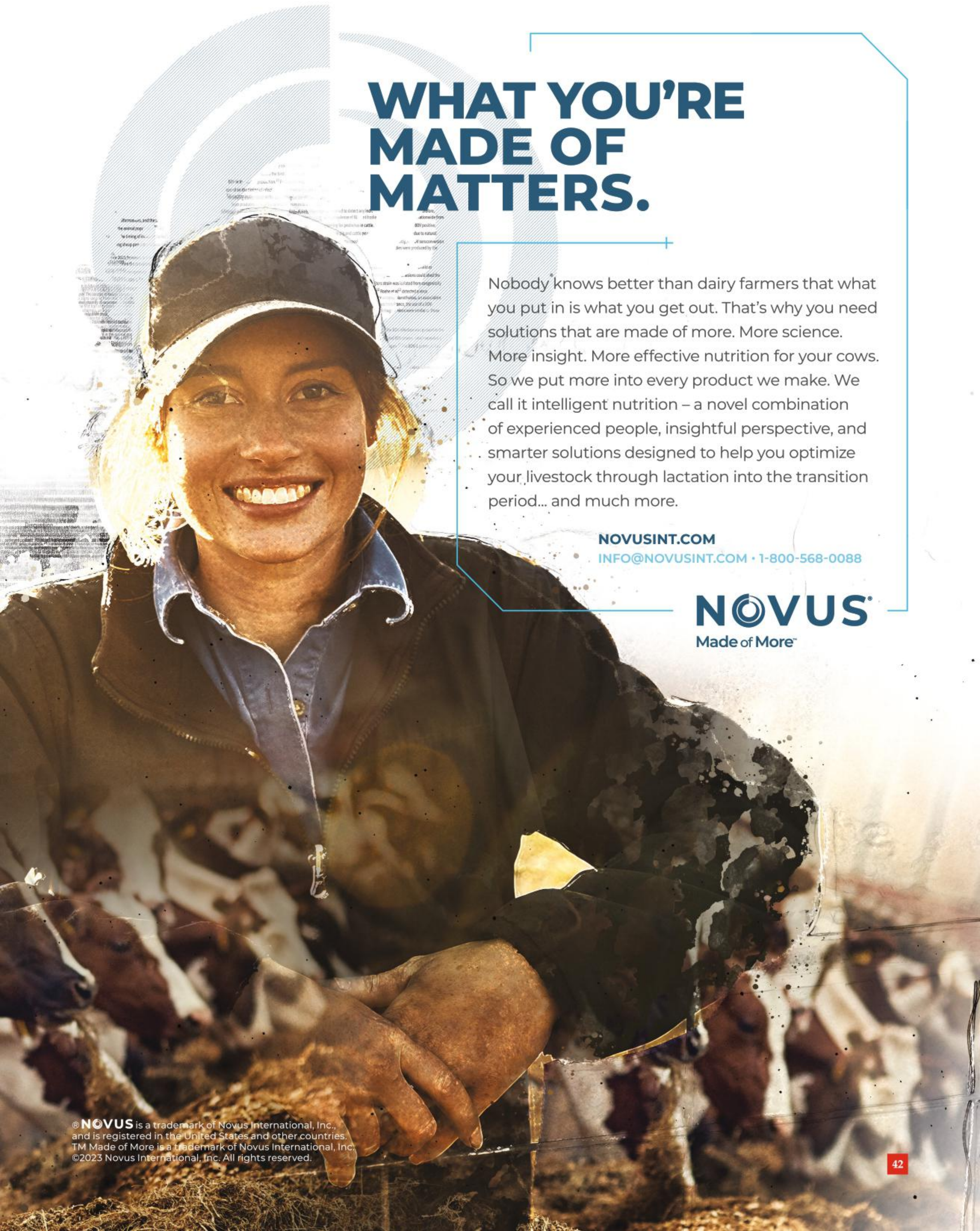
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