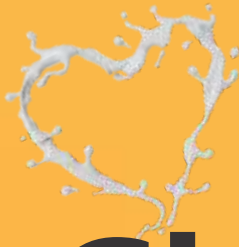


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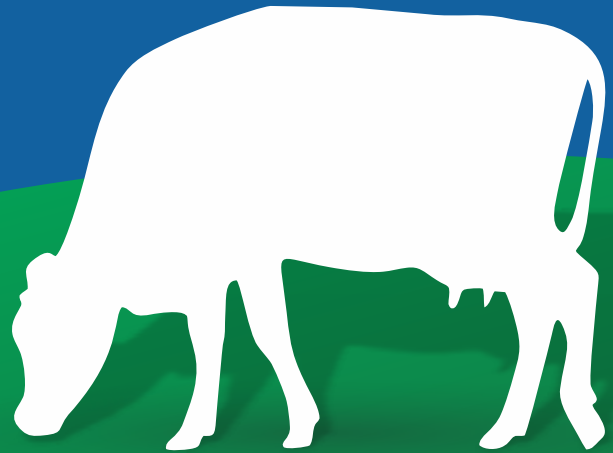
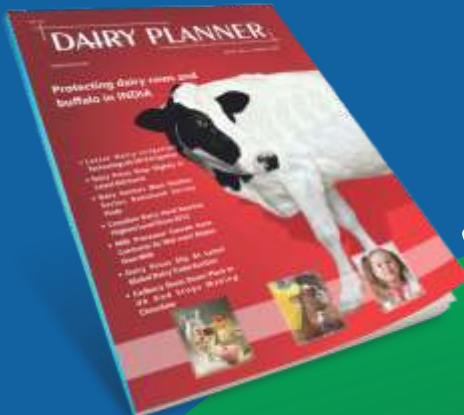
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# From the Pen of Chief Editor



## The Significance of Small Ruminant Husbandry for Sustainable Livelihoods in India

Small ruminants i.e. goat and sheep are a poor man's cow as they adapt to a wide range of climatic conditions, especially in the harsh environments inhabited by the poor and marginal strata of the society and impact the rural economies substantially.

They are raised on pastures and degraded lands unsuitable for the cultivation and produce nutrient-rich milk and meat for human consumption, manure for crop production, and wool, hair and skin for industrial uses.

Better thermoregulation, resistance to diseases, endurance in case of long-distance grazing, and higher feed conversion efficiency combined with lower environmental footprints are some of their unique characteristics which are further aided by their resilience towards climatic stresses, combined with production of a sustainable stream of outputs.

This subsistence oriented ruminant production system in India accounts for 12% of the gross value achieved from animal husbandry.

The diverse agro-climatic conditions, variety of feed resources, and varying probability of disease occurrence add significant relevance to the conservation and improvement of small ruminant genetic resources in their native tracts.

Low social acceptance, lack of definite breeding policy, quantitative and qualitative deterioration of the grazing resources, inadequate health management programmes, unorganized market dominated by middlemen, and limited credit and insurance schemes for small ruminant husbandry are the major production challenges that the backward classes and smallholder farmers engaged in small ruminant production face.

A comprehensive approach with measures like promotion of scientific management practices, standard feeding and management practices, community-based agroforestry for fodder, nationwide vaccination programme against important diseases, marketing and value-added products and promoting commercial farming could work wonders for the small ruminant farmers.

Small ruminant husbandry can play a significant role in supplementing the household income and generating employment, particularly for the landless and marginal farmers and empowering rural women and engaging youth.

*Vishal*

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# Bacteriophages in Dairy Industry

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**Introduction**

Bacteriophages are among the most prevalent and diverse organisms in the biosphere. Bacteriophages, also referred to as "phages" generally, are a particular class of virus that can only replicate in bacterial cells and is parasitic on bacteria after its genome is introduced into the cytoplasm of the bacterium. These are proteins that contain a DNA or RNA genome and can have simple or complex structural arrangements. A typical phage has a tadpole or sperm like structure bearing a head containing nucleic acid enclosed in a protein sheath and a proteinaceous tail with fibres and plate at the bottom.

Characteristics of Phages

- i. They are widely dispersed in the natural world and are most prevalent in animal intestines.
- ii. They can be killed by heating for 30 to 60 minutes at 70 to 75 °C despite their moderate heat resistance.
- iii. Preparations that have been dried are more heat resistant and continue to be useful after drying.
- iv. They are too small to be visible under a standard microscope, making it impossible to filter them out as with case of bacteria.
- v. They have UV light sensitivity.
- vi. They can withstand solutions of

diluted mercuric chloride.

- vii. They are sensitive to dyes, especially when photosensitized, such as methylene blue.

**Importance in dairy industry**

Bacteriophages play a significant role in the dairy sector because they induce starting failure, which is when the starter culture fails to respond and produce the appropriate changes during the fermentation of products, particularly cheese. In some circumstances, if it is identical with the bacterial strain, it may specifically eliminate all the bacteria, preventing fermentation.

The quantity of phage particles in relation to the number of bacteria, as well as the state and nature of the phage, determine the speed of its attack. Factors responsible for phage infection in starter culture are: a) Every starter culture has phage-producing capacity, b) phage is unique to one strain and c) Phages can live for a very long time on utensils and in dried whey. It is the main contributor to slow acid generation in commercial practice.

Factors promoting the incidence of phage attack include:

- A. Milk aeration prior to inoculation
- B. Utilising certain kind of milk
- C. The use of contaminated milk
- D. Use of large amount of culture
- E. The utilisation of stale, sterilised milk

**Source:** Essentially, the most significant source of phages is whey. It can create infection foci and contaminate the air, objects, etc. Therefore, separating the whey is perhaps the most important basic component in preventing its spread. These could be brought in to cheese factories through milk in cans previously used to take whey to farms. Phages may be carried some times with culture. It may develop in improperly cleaned equipment where milk residue accumulate or may be brought in by the contaminated air. Phage contamination

*A bacteriophage, also known informally as a phage, is a duplodnaviria virus that infects and replicates within bacteria and archaea.*



of starter air-borne droplets is necessary not only from whey in the factory but also from effluent which may be flowing near the factory.

### **Prevention and Control against attack of bacteriophage**

**Rotation of Starters:** this is obviously of great value where single strain starters are used, but can also be used for any of its combination of starter organisms. Usually, the phages are strain specific and any strain can acquire a phage at any time and such phage may contaminate a whole factory and its environment by whey droplets. A rotation of starters will thus help to prevent phage attack by preventing a build-up of phage in the factory and its neighbourhood.

**Prevention of air-borne contamination :** It is common to maintain a slightly positive pressure of filtered air in the tank from the beginning of milk cooling and during its incubation period. The filtration of air through a high efficiency particulate air (HEPA) filter which allows less than one in 10<sup>8</sup> phage through the filter.

### **Bacteriophage intensive mutants**

**(BIM):** Phage resistant strains may be obtained by subjecting cultures to phage over several generations. In cheddar cheese making with definitive starter systems, whey at milling is monitored daily for phage levels. When they reach 10<sup>3</sup> -10<sup>6</sup> cfu/ml, the offending strain is removed and replaced by another one or a BIM. Treatment of sensitive strains with phage followed by extended incubation permits phage resistant cells to grow and produce acid. Many of them are slow acid producers but fast acid producing BIM can be detected by plating on differential media which distinguish fast and slow acid producers.

**Phage inhibiting media (PIM) :** These are developed nearly 30 years ago are extensively used in US and in some other countries for starter propagation. Calcium ions are essential for the proliferation of phage and for its penetration into bacterial cell. Since phage cannot develop in calcium deficient media, starter cultures can be maintained there without risk of contamination. The efficiency can be increased by the addition of salts like phosphates and citrates which chelates Ca<sup>++</sup>. Growth stimulants like yeast can also be added. Commercially available PIM vary in its ability to prevent phage multiplication



*In this electron micrograph of bacteriophages attached to a bacterial cell.*

and do not support growth of some starter. To counter act that and to lower the cost , milk based PIM is replaced by whey based PIM.

**Cleaning of vats:** If the phage numbers are high in the whey at the end of cheese making, they can contaminate the milk in the subsequent batch of milk in cheese vat and rapidly destroy the bacterial cells. It can be calculated that 1 ml of whey having 10<sup>8</sup> phages/ml of fresh milk can infect 10,000 litres and fresh cheese milk in the vat with 10<sup>8</sup> phages/ml so chlorination of cheese vats with 500-600 mg/litres active chlorine for 10 minutes is necessary for disinfection of vats and vessels.

- i. Dairy floors should be cleaned regularly with effective detergent.
- ii. UV rays kills bacteriophages but the lamps can be fit only outside
- iii. The use of direct vat inoculation of concentrated starter cultures to avoid pre -ripening period is also important.

**Aseptic cultures:** Use of aseptic techniques for propagation and production of starter culture and effective sterilization of all equipments at all

stages will help to produce a sterile culture.

**Genetic manipulation:** Good starter cultures form the basis of preparing good quality fermented milk products in the dairy industry. Since the behaviour of culture is governed by genetic make-up, the alterations or modifications at genetic level is helpful in making them more useful and advantageous. Genetic advancement in the form of conjugation, transduction, protoplast fusion, transformation etc. have opened up new areas and exciting possibilities for using recombinant DNA technology to improve existing strains and construct new ones.

### **Other methods:**

- Separate pressurized room for propagation of starter.
- Location of starter room far away from production handling room
- Proper and effective heat treatment of media to destroy bacteriophages
- Small-scale culture transfers using laminar flow enclosures
- Producing bulk starters or even retail product for use in direct -to- vat system.





# Lactation in Dairy Cattle

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**Lactation**

- Lactation refers to the combined process of milk secretion and removal. It includes two processes
  - Lactogenesis - initiation of milk secretion.
  - Galactopoiesis - maintenance of milk secretion.

**Lactogenesis**

It is the process of differentiation in which the mammary alveolar cells acquire the ability to secrete milk. Lactogenesis includes two stages:

- Stage I occurs before parturition in which alveolar cells differentiate and acquire a limited capacity for milk secretion
- Stage II begins shortly before parturition and continues for several days postpartum in which the alveolar cells are able to secrete copious amount of milk components. Secretory cells before parturition can secrete caseins and milk fat. Lactose synthesis is the key to the secretion of large volumes of milk

**Hormones required for lactogenesis:**

- Progesterone of pregnancy blocks lactogenesis. For the synthesis of lactose,  $\alpha$ -lactoalbumin, and casein, PRL is required. Progesterone

inhibits the binding of PRL with PRL receptors in the mammary gland and prevents synthesis of these components, thereby lactogenesis is blocked.

- Progesterone secretion starts to decline during late pregnancy and mammary gland becomes responsive to the lactogenic hormones – insulin, glucocorticoids and prolactin.
- Mammary alveolar differentiation is stimulated by these lactogenic hormones and secretory apparatus develop in alveolar cells
- Insulin and/or IGF-I cause alveolar cell multiplication and seem to be necessary for lactogenesis. Insulin increase glucose uptake by alveolar cells by stimulating glucose transport into the cells which are needed for lactose synthesis and may also increase expression of milk protein genes
- Glucocorticoids secretion stimulated by ACTH are involved in intracellular synthetic machinery development for protein synthesis and are involved in transcription of casein and  $\alpha$ -lactoalbumin genes. Mammary glucocorticoid receptors increase late in pregnancy
- Prolactin is also responsible for switch over from 1st to 2nd stages

▽ **Lactogenesis is the process of differentiation in which the mammary alveolar cells acquire the ability to secrete milk.**





of lactogenesis; PRL receptors and its blood concentrations increase at that time. It synergize with Insulin and glucocorticoids in transcription of casein and  $\alpha$ -lactoalbumin genes, translation of milk protein mRNA and for milk secretion

- Estrogen is indirectly involved with lactogenesis - increase PRL receptors at parturition and control PRL release from pituitary
- Somatotropin has no direct effects and may through IGF-I (somatomedin secreted by liver) - may have PRL-like activity with elevated levels
- Local Factors may also effect lactogenesis probably by working through autocrine or paracrine mechanisms
- Prepartum milking can initiate lactation – neural impulse to hypothalamus initiates PRL and ACTH secretion leading to mammary cell secretion.

### Galactopoiesis

It is the maintenance of lactation. It requires hormones and the removal of milk from udder.

It involves maintaining the alveolar cell numbers and function After parturition, milk yield increases in cows, which reaches a maximum in 2 to 8 weeks and then gradually declines, which is due to decline in the number of secretory cells.

If milk is not removed frequently from the mammary gland, synthesis of milk will not persist even with adequate hormonal levels.

### Hormones of galactopoiesis:

Maintenance of lactation requires hormones - GH, ACTH (glucocorticoids), insulin, thyroid hormones, prolactin and PTH.

- Prolactin is the primary component of the galactopoietic complex especially in monogastric animals but it is not necessary for galactopoiesis in ruminants where inhibitors of prolactin do not suppress lactation with slight reduction in milk yield in ewes; if given endogenously PRL will increase milk yield
- Suckling or milking induces PRL surge in blood (peak value reached

in 30 min) with a decrease in dopamine; this response declines with advancing lactation.

Temperature and light also stimulate prolactin - warmer temperatures and artificial lighting in winter and fall can increase mammary development and milk yield

- GH is very galactopoietic in ruminants and necessary to maintain lactation
- The thyroid hormones influence the milk synthesis and duration of secretion.
- Insulin is required for glucose uptake in the mammary gland.
- ACTH releases glucocorticoids which are necessary to maintain mammary cell numbers and alveolar cell metabolic activity. Corticosteroids also Influences expression of casein genes

### Milk removal and galactopoiesis

Acute accumulation of milk increases intramammary pressure, activates sympathetic nervous system, decrease mammary blood flow, decreases hormones to mammary gland which will eventually cause cell apoptosis. Nursing stimulus triggers release of galactopoietic hormones especially PRL which may stimulate next round of secretory activity in cows, reproductive cycles restarts even when milk production is high.

### Biosynthesis of Milk

- Mammary epithelial cells take precursors for milk synthesis from blood through the basal and lateral membrane and discharge the milk through the apical membrane into the lumen of alveolus.
- Mammary alveolar cells synthesize fats, proteins and carbohydrates
- Fat first accumulate in the basal cytoplasm of the cell, then move to the apex where the droplets protrude into the alveolar lumen.
- Triglycerides constitute 97% of milk fat with rest formed by phospholipids and cholesterol. About 40-50% of the fatty acids used for the synthesis of milk fat by mammary epithelial cells are synthesised from precursors (do novo synthesis). Remaining fatty

acids used in the synthesis of milk fat are preformed and taken up from blood by mammary epithelial cells

- Bovine milk fat consists of large proportions of short-chain fatty acids (C4-C16). The fatty acids and glycerol are synthesized in the cytoplasm and the triglycerides are formed in the endoplasmic reticulum of the mammary epithelial cells.
- The fatty acids are synthesized from three major sources
- Acetate and  $\beta$ -hydroxy butyrate—primary source formed in rumen, transported to mammary Biosynthesis of Milk gland. Acetate contributes to C4 toC14 fatty acids of milk. In non ruminants acetyl CoA from glucose is the major source for milk fatty acids
- Fatty acids of the triglycerides present in the circulatory system as low-density lipoproteins and chylomicrons are another source. They contribute fatty acids C16 and above. Half of milk fatty acids are derived directly from blood triglycerides
- Cytoplasmic acetyl CO-A from glycolysis and TCA cycle is the third source.
- Glycerol for triglyceride synthesis is derived from glycerol 3-phosphate of glycolytic pathway or from lipolysis of triglycerides in the mammary gland.
- Major milk proteins are (1) caseins ( $\alpha$ ,  $\beta$  and  $\kappa$ ), (2)  $\beta$ -lactoglobulin and  $\alpha$ -lactalbumin (3) immunoglobulins (4) Lactoferrin, lysosomal enzymes and other specific proteins.
- Caseins are phosphorylated proteins and present in varying proportions in different species – in ruminants 80% of total milk proteins is caseins, in mares 50% and in human 40%
- Lactalbumins in milk include  $\alpha$ -lactalbumin synthesized by mammary epithelial cells and serum albumin transferred from blood.
- Milk immunoglobulins are derived from blood as preformed proteins Milk has lower concentration of IgG while colostrum contains a high level of IgG. IgA and IgM are also

present in milk synthesized by plasma cells in mammary gland

- Lactoferrin is milk-specific protein synthesized by mammary epithelial cells and helps to keep iron in bound form in milk. Lysosome enzymes have antibacterial effect.
- Milk proteins are synthesized on the endoplasmic reticulum; the casein molecules pass to the golgi apparatus for phosphorylation, forms micelles within the golgi vesicles.
- Several genetic variants of milk proteins occur; the genetic polymorphism of milk proteins are useful for genetic identity of the animal
- Lactose, a disaccharide composed of glucose and galactose connected by  $\beta$ -1-4 glycoside bond, is found exclusively in milk. It is synthesised from two molecules of the precursor glucose. One glucose is converted to galactose; lactose synthase catalyses the reaction between glucose and galactose to form lactose.
- The lactose synthase is composed of two subunits—galactosyl transferase and  $\alpha$ -lactalbumin. During pregnancy progesterone blocks the secretion of  $\alpha$ -lactalbumin, a milk whey protein. At the beginning of lactation, PRL induces synthesis of  $\alpha$ -lactalbumin and stimulates lactose synthesis. Lactose is synthesized within golgi vesicles, released in conjunction with milk protein. The golgi vesicles fuse with the cell membrane and release protein and lactose by exocytosis.
- During lactation, 70-80% of available glucose is utilized by the udder for lactose synthesis and ruminants are prone to glucose deficiency during peak lactation.

#### Induction of Lactation

- Lactation can be artificially induced in dairy cattle by the use of variety of hormones when the mammary gland contains sufficient numbers of alveolar cells.
- Subcutaneous injection of a total



**Acute accumulation of milk increases intramammary pressure, activates sympathetic nervous system, decrease mammary blood flow, decreases hormones to mammary gland which will eventually cause cell apoptosis.**

daily dose of 0.1-mg/kg body weight of oestradiol-17 and 0.25mg/kg body weight of progesterone dissolved in 100% ethanol in divided dose at 12 hours interval for 7 days will initiate lactation in about 60 to 70% of heifers and cows. The percentage of success rate increases to 100% if 5mg of reserpine (a tranquilizer) is administered on day 8, 10, 12 and 14 to increase the prolactin level in these animals.

- Lactation starts between days 14 and 21 after initial injections of estradiol-17 and progesterone.
- ACTH or glucocorticoids in large doses inhibit lactation in ruminants and rats
- GH produces a dose-dependent increase in milk yield in dairy cows. The increase in milk yield by GH is produced by nutrient partitioning from body tissue requirements to milk synthesis.
- Recombinant bovine GH (bST) has been employed to increase milk yield in lactating animals. Injection of GH three times a week stimulates short term increase in the milk production by 10% in early to mid-lactation and up to 40% in late lactation and 15% feed efficiency, whereas reduces the feed intake by 29% in high producing cows.
- Fertility may be altered but does

not affect cow's health other than problems associated with high milk production. bST increases synthesis of lactose, fat and protein

- Injection of low dose of synthetic glucocorticoids stimulates milk yield by 14 to 18%.
- Iodocaesin and L-thyroxine have been used to induce milk production. Iodinated casein, (0.5 percent crystalline thyroxine) has been fed to dairy cattle at a rate of 1 to 1.5 g per 45kg of body weight daily, resulting in an increase in milk production of 10 to 30 per cent.
- Extra feed must be provided to prevent weight loss and milk production declines abruptly following withdrawal of thyroproteins. Thyroproteins increase the need for more nutrients, reduces body weight and interferes with the ability to withstand thermal stress.
- Thyroprotein fed to dairy cows at the peak of lactation stimulates milk production by about 10%, whereas during declining phase of lactation it stimulates the milk production by 15 to 20%. Usually a greater increase in milk production occurs in high producing cows and older cows. The maximal increase usually occurs during the first 60 days of thyroprotein feeding. However, beneficial effects disappear within 2 to 4 months.

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# Managemental and Epidemiological Strategy to Control Re-emergence of LSD

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## Introduction

Lumpy skin disease (LSD) has affected the animals across the globe. The etiological agent of this disease is LSDV (Lumpy Skin Disease virus) belonging to genus capripoxviridae and family poxviridae. The incubation period for this disease is 1- 4 week under field conditions, depending on virulence of strain and host susceptibility severity of clinical signs of LSD varies from subclinical to fatal. This disease causes high morbidity (3-85%) but low mortality (<10%) and LSD is listed as notifiable disease by World Organization for Animal Health. In recent outbreaks in India, it caused severe mortality in various states. This disease can be transmitted directly (from diseased to healthy animal), through hematophagous vectors (mosquitoes, flies and ticks) and by vertical transmission (infected semen and intra uterine transmission from infected mother to foetus). Animals affected from LSD suffers through high fever, swelling of limbs, nodules on skin, mucus membrane, internal organs and lymphadenopathy. This disease cause weight loss, decreased milk yield, poor hide quality, abortion in pregnant females and infertility in males. This disease is re-emerged in various countries so there are chances of re-emergence of this disease in India this year. To prevent drastic losses which we have seen in last year some managemental and epidemiological should be practiced to prevent its re-emergence.

## Managemental practices to prevent LSD

### **Vaccination and Vector control**

Annual vaccination strategy with homologous strain of the LSDV is obligatory in endemic areas. India developed lumpy skin vaccine named

Lumpi-ProVaInD which contain live attenuated virus. Earlier the sheeppox and goatpox vaccines were used. Abundance of blood feeding vectors and presence of suitable insect breeding sites at a farm should be identified. Vector control is the important aspect for this disease because vector play significant role in transmission.

### **Limit the movement of Animals**

Movement control among grazing areas, villages, states and borders. Animals which graze on pasture lands are at high risk as they can get infection from other animals. Awareness raising and communication on LSD risk to farmers and other stakeholders

### **Carcass disposal, Cleaning and disinfection**

In case of mortality dispose the carcass by burial method. Disinfect the shed and utensils of infected animal. Use disinfectants like phenyl, potassium permanganate solution to clean the floor. Spray 2-3 % solution of sodium hypochlorite in sheds. Smoke of cow dung cake with neem leaves and camphor helps to control mosquito and flies.

### **Quarantine policy and Management of infected animal**

Quarantine measures should be applied for new animal introduced in herd. If animal show symptoms of lumpy skin disease, isolate the animal. As animal shows symptom, isolate the animal. Separate the arrangement of feeding and watering. Provide good quality fodder, plenty of water to sick animal. Report nearest Veterinary hospital.

### **Bulls used for breeding need to be diagnosed for LSDV**

Transmission via contaminated bovine

semen has been experimentally demonstrated and consequently, artificial insemination or natural mating should be considered as risk factors for transmission during an outbreak.

### **Epidemiological Approach to prevent re-emergence of LSD**

The Epidemiological approach to control re-emergence include adoption of global and other association guidelines. The following approach is adopted from ASEAN (The Association of South-East Asian Nations). This approach focuses on nine areas which are

#### **1. Animal health emergency preparedness**

Development of emergency plans for the region and each country and importance of system readiness having key functions in operationalize plans effectively and efficiently. The two fundamental components of animal disease emergency preparedness are

##### *Early warning*

Early warning enables rapid detection of the disease and to Identify the disease which have the potential of developing to epidemic proportions and causing serious socio-economic consequences and public health concerns.

##### *Early reaction to disease epidemics and other animal health emergencies*

Early reaction means carrying out disease control activities without delay and to eliminate the disease and infection in the shortest possible time and in the most cost-effective way.

#### **2. Surveillance, risk assessment and response**

Surveillance, risk assessment and response are fundamental for decision-making in order to minimize the consequences of animal health and food safety emergencies such as economic, social and public health consequences. Surveillance includes collection and analysis of information relating to the disease in a systematic and ongoing manner, as well as timely distribution of information so that the right decisions can be taken. Risk assessment ensures a

proportionate response to an animal health, food safety and public health risk and to prioritize and mobilize resources. Response includes efficient application of resources. There must be a series of measures that are operating at the same time, having high level of efficiency and full integration with each other.

**3. Laboratories** – Laboratories are necessity during the phases of prevention, detection and response. The logistics consists of the need for medicines, vaccines, equipment and laboratory readiness in detecting diseases. Diagnostic laboratories as a means of confirming the diagnosis of animal diseases must be equipped with facilities and infrastructure. In supporting the success of the test, it takes at least 4 things, namely: personnel; equipment, inventory / stock and emergency funds.

**4. Zoonosis** - Zoonosis is a disease that can be transmitted from animals and vice versa. In the last 2 decades and in the current era of globalization, emerging infectious diseases (EID) and re-emergence of infectious diseases are accelerating. As many as 60% of diseases that infect humans are zoonotic diseases.

#### **5. Prevention through animal health treatment**

Establishing effective of animal health frontline services is essential for early detection of the diseases and to response the disease in timely manner. The key elements of this focus area are:

- The ability to rapidly identify, report and manage animal health, zoonosis in a way that minimizes mortality and morbidity of the animals and minimize the risk to public.
- Comprehensive animal health facility plans for preparing for and responding to outbreaks and animal health emergencies are developed and implemented

#### **6. Risk analysis and risk communication**

Risk analysis can be applied at each stage of the emergency animal disease preparedness process which includes,

Priority ranking of infectious disease threats for the country and region, Determining import quarantine policy and how quarantine and other disease prevention procedures need to be strengthened, Planning well-focused training courses for staff, farmer awareness and publicity campaigns, Determining how and where disease surveillance and other epidemiological systems need to be strengthened and Planning disease response strategies, including comparative evaluation of different disease control options.

#### **7. Regional preparedness, alert, and response**

Regional preparedness and response provide support to member countries at any time during emerging animal disease outbreaks or emergencies. A regional rapid response mechanism is a resource to enhance regional emergency response capacity and strengthen its ability to respond to animal health security threats regionally and internationally. This may involve working with partners for event management and coordinated action, mobilization of emergency teams and response logistics, such as accessing stockpiles and mobilizing resources.

#### **8. Recovery**

When it is believed that infection has been eliminated, a series of verification programmes should be carried out. However, in some cases, a certain disease could not be eliminated and become endemic in the country. An important aim of these will be to provide objective proof to other countries and to the international community that the country is now free from the disease or controlled.

#### **9. Monitoring and evaluation**

M&E is a management tool that assesses what has taken place to facilitate continuous learning and improve future work. M&E systems are incorporated in national work plans to measure health system functionality, promote system improvement and ensure mutual accountability for health security. M&E processes measure whether systems are working, not just whether capacities are in place.



# Striking a Balance: Optimizing The Milk Production and Animal Welfare in Cattle

Celus.C.S, S.F. Ahmad\*, Sakshi Vaishnav

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## Introduction

Milk is a highly demanding source of animal protein all over the world. With the growing human population, animals are entrusted to feed ever-increasing human population with high-quality yet cheaper sources of protein. Under these circumstances, the focus is shifted toward high production efficiency. In the last forty years, production has doubled, courtesy to the contributions from improved interventions with respect to genetics, managerial and reproductive techniques. Despite several developments in augmenting production, India still lags behind in terms of quality of food products of animal origin.

Recent studies have shown that production pressure increases physiological and psychological stress on animals. The enforced high production also demands changes in housing, management, and feeding activities, especially during adverse environmental conditions. It should be viewed with more attention since high production comes at the cost of fertility, longevity, performance with respect to fitness and functional traits and leads to many metabolic syndromes. Studies have proven the existence of negative correlation between production level and the occurrence of mastitis and other disorders, especially metabolic ones. It results in deteriorating animal welfare, which is an indicator of sustainable production systems. Keeping the aforementioned points in mind, the Nordic countries have adopted multi-trait selection procedures rather than increasing production alone, thereby giving appropriate weightage to reducing the ill effects of high production. Although animal welfare may not generate direct income for farmers, there are financial benefits associated with it. These benefits include lower incidence of disease and mortality, reduced treatment expenses, improved product quality, enhanced resistance to parasites and other harmful agents, increased consumer

satisfaction, and higher earnings from the sale of high-quality products.

## Negative impacts of high milk production

Higher production and subsequent economic return are the major drivers for the intensification of dairy systems. However, it stems from the dilution of management and feeding aspects. Though some argue that intensification reduces methane emissions and increases efficiency, this also leaves a large amount of waste leading to environmental issues from high input systems. The other major concern is the reduced genetic diversity arising from narrow breeding and selection policies to improve the production level. Artificial insemination, which is a major pillar for genetic improvement, has increased the inbreeding level in animals. In addition, selection for the small number of traits and choosing only the specific high-producing animal breeds have questioned the existence of many locally adapted milch breeds. The genomic selection also contributed to a rapid accumulation of inbreeding per year (Makanjuola et al., 2020). Moreover, genetic selection for production adversely affects the reproductive abilities of the animals with lowered conception rates, pregnancy rates, prolonged calving intervals, and an increased number of inseminations per conception. There exists an antagonistic relationship between production and functional traits, which is more evidenced during the postpartum intervals when the animal is experiencing a high negative energy balance. This pushes the animals into a wide range of metabolic disorders, thereby increasing treatment costs and economic loss. Ketosis and displaced abomasum cases are reported to be high during this period.

Climate change and global warming also added to the worsening states of physiological and thermal stress to the animals. It is noteworthy that thermotolerance is adversely affected by increased production potential because



the metabolic processes behind the enhanced milk production leave more heat than normal (Tao et al., 2020). This also affects the estrus duration and normal uterine function, leading to poor embryonic survival rates (Becker et al., 2020). Additionally, there will be an increased risk of infections during this period from a depressed immune system. In the cold season, on the converse, the energy will be diverted to increase the body temperature thereby reducing the average milk production during these days. All these factors are affecting the welfare of animals directly or indirectly, therefore the concern for animal welfare is needed to be addressed.

### Indicators of cow welfare

Animal welfare refers to how the animal's body and mind can cope with living conditions. When they are exposed to different factors like temperature differences, scarcity of food and water, diseases, and noises, the animal gets stressed and shows a wide range of indicators, like increased respiration rate, depth, and body temperature due to the action of cortisol and other hormones. The prolonged stress causes exhaustion, which retards growth, production, and reproductive performance. Mastitis is another indicator, causing pain and discomfort from the inflammation of the mammary gland, decreased milk production, premature culling, treatment, and labour expenditures. Generally, the condition is caused by 'contagious' or 'environmental' pathogens, of which environmental source due to poor hygiene in the housing systems accelerates the incidence rate. Similarly, milk somatic cell counts also indicate cleanliness in and around dairy farms.

The lying behaviour is yet another indicator pinpointing the comfort and health of the animals. During the heat stress, it gets reduced up to 30% to increase the heat dissipation by elevating the surface area. It causes an increase in energy requirement and contribute to decreased production and the associated hoof diseases from the pressure exerted on the hooves. Whereas, during the cold season, the huddling of animals, piloerection, and lowered rectal temperature can be used as stress indicators.

### Best practices for achieving optimal milk production and animal welfare

Maintaining the ambient temperature is



Figure. 1 : Methods for optimizing milk production through managing climate stress.

one of the effective ways to reduce stress during challenging climate changes (Figure. 1). Protection from the cold and hot environment through scientifically constructed shelters helps to reduce mortality and improve performance. In addition, an adequate quantity of fresh water should be provided (not warmer than the groundwater) or cool water to prevent the rise in the core body temperature. Otherwise, any cooling strategies can be adopted such as sprinklers or fans for beneficial cooling or can adopt suitable roofing materials according to the area of housing. Using fans and sprinklers can also minimize the insect attacks on animals. Barn roofs can be grown with creeper plants so that solar rays will not hit directly on the top.

During heat stress, a high level of feeding is necessitated, and the farmers gorge their animals with high-energy low-fiber concentrates. This results in excessive acid production and other metabolic disturbances with lowered appetite and dry matter intake. Therefore, it is advised that the ration should have a high proportion of fiber, rather than simply increasing the energy density. In summer periods, changes in ration and altering the timings of feeding will be beneficial. Adding fats to diets (not more than 5 to 7%) and ionophores has also been suggested to enhance energy efficiency.

On the contrary, farmers should switch to alternative measures during the cold season, when the animals may suffer or even die of hypothermia, frostbite, and starvation. Covering the animals, mainly the sick and weak ones, with sackcloth/blankets/gunny bags, will protect them from a heavy cold. At night, the animals must be provided with dry covered shelter, avoiding damp areas. Since grazing will not be possible during extreme winter, animals should be provided with enough fodder, while kept

indoors. It is recommended to offer dry straw as bedding, provide feed with high protein and energy content, and include a combination of salt and fat in the feed as a means to promote animal welfare. Moreover, after milking, the teats should be kept dry to prevent cold stress. It is advisable to build structures in east-west orientation, featuring two walls with a gap of 3-4 inches between them. The slanting roofs with an asbestos sheet and ceiling are recommended for areas with similar conditions. Inside the barn, adequate space must be available for animals to freely move around and express their natural behaviours. For instance, when calves and yearlings are housed together 1.5 m<sup>2</sup> per 150 kg live weight is needed while, for animals with 150–220 kg live weight, 1.7 m<sup>2</sup> would be sufficient (Koknaroglu and Akunal, 2013). Good ventilation, control of parasites, and low ammonia and other harmful gases in the air are other requirements.

### Conclusion

Animal welfare can be assured through appropriate breed selection based on climate conditions, building climate-adaptive shelters, utilizing scientifically designed feed with additives, and ensuring that the animals have access to high-quality feed and water. It is also advised to go for multi-trait for selection to reduce the adverse effects of solely focusing on production traits. In current era of digitalization, animal health can be monitored through the use of sensors, cameras, or videos, and can shift to automated milking systems and precision feeding to improve both production and welfare concurrently. Ultimately, the goal of sustainable dairy farming is to achieve a balance between productivity and animal well-being, while also minimizing environmental impact and ensuring economic viability for farmers.



# Reducing Methane Emissions: Solution for A Sustainable Future

## IT'S ALL ABOUT METHANE (CH<sub>4</sub>)

Greenhouse gases (GHGs) warm the Earth by absorbing energy and slowing the rate at which the energy escapes to space; they act like a blanket insulating the Earth.

### Methane (ch<sub>4</sub>) as greenhouse gas

An effective greenhouse gas.

Methane's lifetime in atmosphere is much shorter than CO<sub>2</sub> but is more efficient in trapping radiation than CO<sub>2</sub>.

It is emitted during the production & transport of coal, natural gas & oil. It also results from livestock and agricultural practices (a predominant source).

Methane emissions from manure and gastro-enteric releases from livestock account for roughly 32% of human caused methane emission. Population growth, economic development & urban migration have stimulated unprecedented demand for animal protein.

**Ruminant livestock can produce 250-500 L of methane per day. Cattle are responsible for most emissions, representing about 65% of the livestock sector's emissions.**

Enteric CH<sub>4</sub> is by-product of ruminant digestion produced by methanogenic organisms by the process called Fermentation or Methanogenesis. As CH<sub>4</sub> is exhaled or eructated into atmosphere, the ruminant suffers loss of energy depending on the diet.

CH<sub>4</sub> tends to decrease as the protein content of the feed increases and increases as the fibre content of feed increases.

**Greenhouse gas emission** - Asia produce the highest, followed by Latin America and the Caribbean, Europe, North America, Africa and Oceania (Gerber, 2013)

**Enteric methane emissions are single largest source of direct Greenhouse gas in beef & dairy cattle.**



**Dr Samisha**  
Technical Support  
Ayurvet Limited



**Dr Nikita Samant**  
Technical Support  
Ayurvet Limited

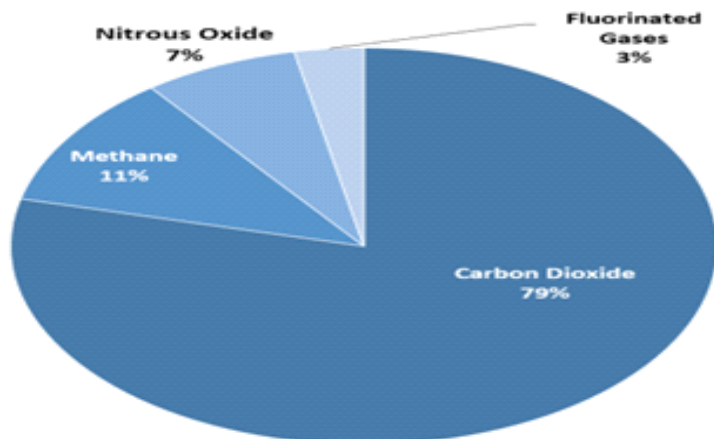
### Greenhouse Gases

Any gas that has property of absorbing infrared radiation (net heat energy) emitted from Earth's surface & reradiating it back to Earth's surface are GHG.

Carbon dioxide, Methane, Nitrous oxide are most important greenhouse gases.

The effect of each greenhouse gas on Earth's climate depends on its chemical nature and its relative concentration in the atmosphere.







### Overview of U.S. Greenhouse Gas Emissions in 2020



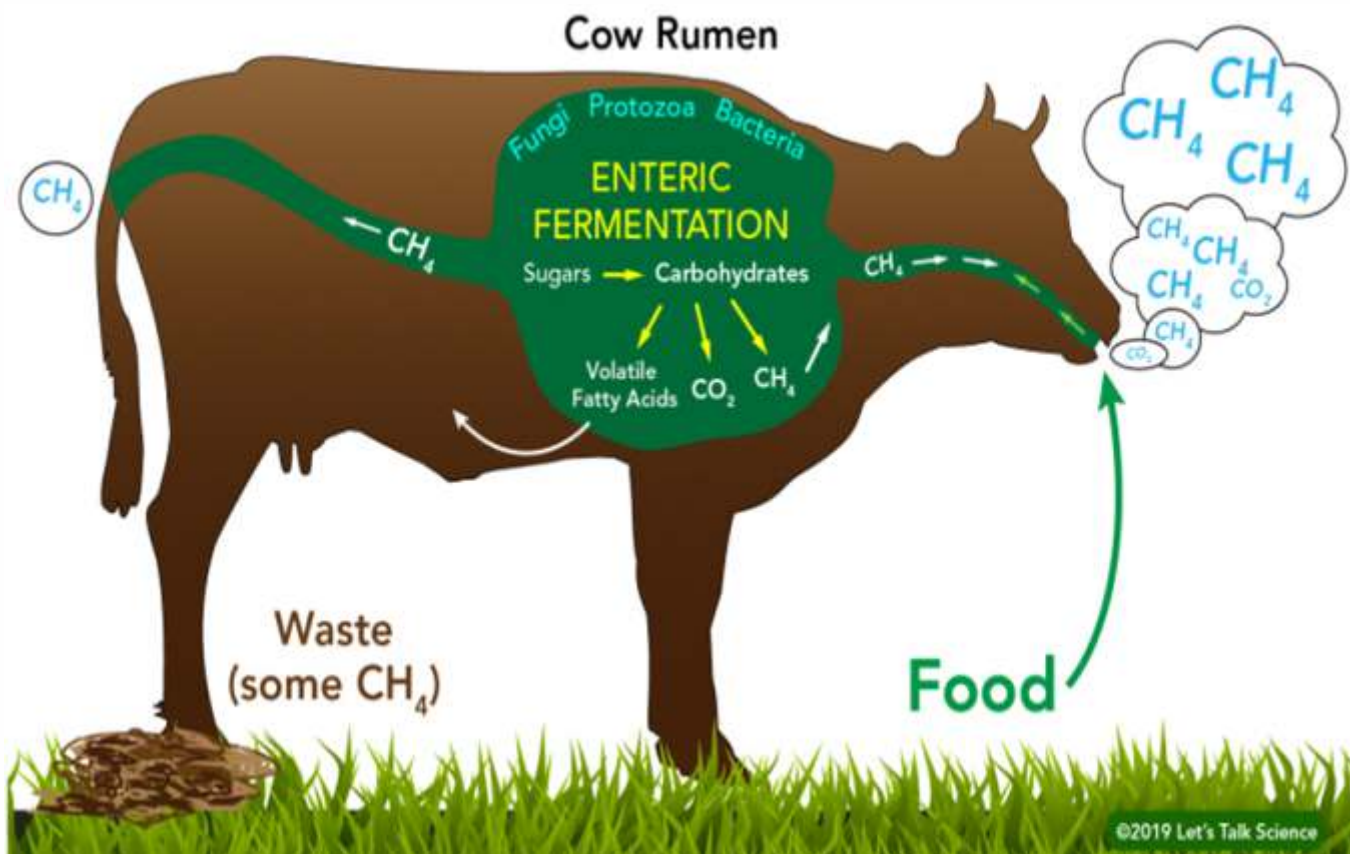
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# FACTORS INFLUENCING METHANE EMISSION FROM CATTLE

-  LEVEL OF FEED INTAKE
-  TYPE OF CARBOHYDRATE IN DIET
-  FEED PROCESSING
-  ALTERATION IN RUMEN MICROFLORA
-  ANIMAL SIZE, GROWTH RATE, LEVEL OF PRODUCTION
-  ENVIRONMENTAL TEMPERATURE

Enteric fermentation is highly evolved process that allows ruminants to digest cellulose, the basic component of plant cell wall. Rumen microbes ferment simple and complex carbohydrates like cellulose to produce volatile fatty acids (VFAs), which can satisfy over 70% of the energy requirements of the host animal. However, the production of certain VFAs also produces Hydrogen, which is converted to  $\text{CH}_4$  by methanogenic archaea (i.e., methanogens). Methanogenens often uses the hydrogen and carbon dioxide produced by carbohydrate fermentation, as VFAs are formed.





## METHANE REDUCTION STRATEGIES

Reductions in methane production from ruminant animals can result from a reduction in rumen fermentation rate (suppression in microbial activity) or a shift in volatile fatty acid (VFA) production.

- **Feeds, feeding management & nutrition** - feeding good-quality feeds can increase animal productivity and feed efficiency. Certain feeds can enhance propionate or decrease acetate production, decreasing Hydrogen that would be converted to  $CH_4$ .
- **Rumen modifiers** - feeding specific substances that directly or indirectly inhibit methanogenesis or using

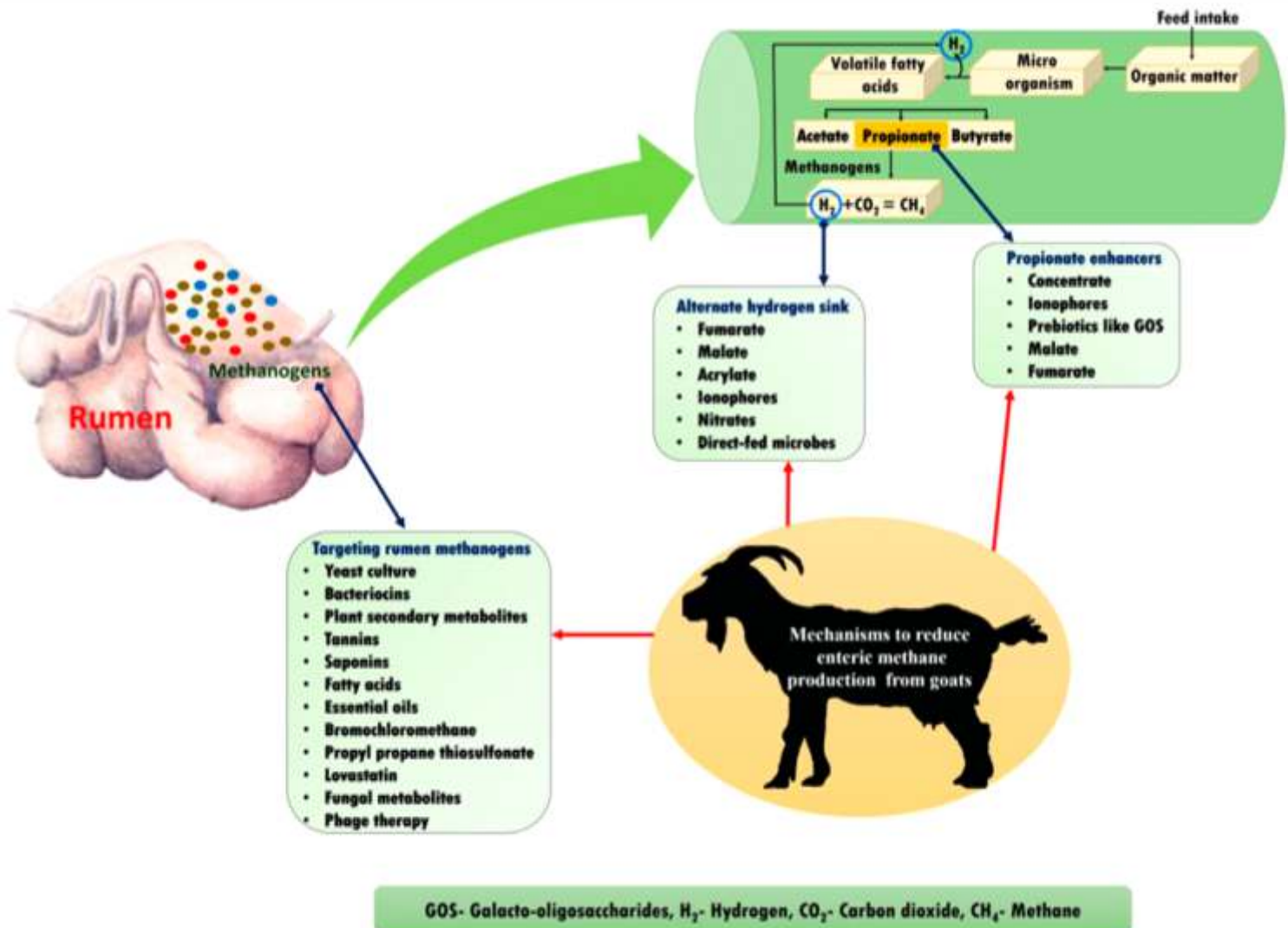
biological control (defaunation, bacteriocins, bacteriophages, and immunization) directed at reducing methanogens.

- **Increasing animal production through genetics & other management approaches**- Improving nutrient utilization for productive purposes to dilute out maintenance on an individual animal or a herd basis, increasing feed efficiency and decreasing  $CH_4$  per unit of product (meat or milk). Total  $CH_4$  emissions will be decreased if annual production of milk remains constant and fewer cows are needed to produce the same amount of milk.

More than 100 countries joined a U.S.- and EU-led effort to cut emissions of methane 30% by 2030 from 2020 levels.



UNEP Food Systems and Agriculture Advisor James Lomax says the world needs to begin by “rethinking our approaches to agricultural cultivation and livestock production.”





The short lifespan of CH<sub>4</sub> means that it may be possible to mitigate climate change more rapidly by reducing enteric CH<sub>4</sub> emissions than by reducing CO<sub>2</sub> emissions because the CO<sub>2</sub> can remain in the atmosphere for up to 200 years. Therefore, mitigating the CH<sub>4</sub> from cattle offers an opportunity to reduce GHG emissions and climate change.

Ruminant production systems will face tremendous challenges in the next forthcoming years due to the increasing demand for beef and milk by the burgeoning population. There is a need to reduce emissions of greenhouse gases from ruminant production systems while increasing energetic efficiency of protein and fat synthesis. A large variety of plants containing

secondary metabolites [tannins, saponins, and flavonoids] have been evaluated as cattle feedstuffs and changes in volatile fatty acid proportions and methane synthesis in the rumen. Herbs like: Acorus calamus, Allium sativum, Zingiber officinale, Terminalia chebula, Azadirachta indica, and many more have been well documented for methane reduction.

**The UK Government has launched a UK-wide call for evidence asking agricultural industry, scientists and the wider public for information on the use of new types of animal feed products that can reduce methane emissions from livestock.**

**Ayurvet endeavour is to blend the ancient knowledge of Ayurveda with modern technology to deliver quality assured, scientifically tested products for animal health care.**

**Ayurvet's Ruchamax (appetite stimulant & digestive tonic) that has shown result in reducing methane emission as well as improved digestibility, weight gain and health. It works in its unique 4 way action for Improved Digestion & Milk Production by:**

- 1. Increased Salivary Secretions**
- 2. Improved Microfloral number & activity**
- 3. Increased Rumen Motility**
- 4. Optimum pH**

**Thus, Ruchamax has both implications for efficient animal production & on global environmental protection.**





# Zoonotic Diseases in Dairy Sector: An Ongoing Challenge in Rural India

*Apart from Brucellosis and Tuberculosis, there are many other zoonotic diseases that can affect dairy animals and pose a threat to human health. For example, Salmonella, Campylobacter, and E. coli can all be transmitted to humans through the consumption of contaminated milk or meat. (Picture is only for representation purpose.)*

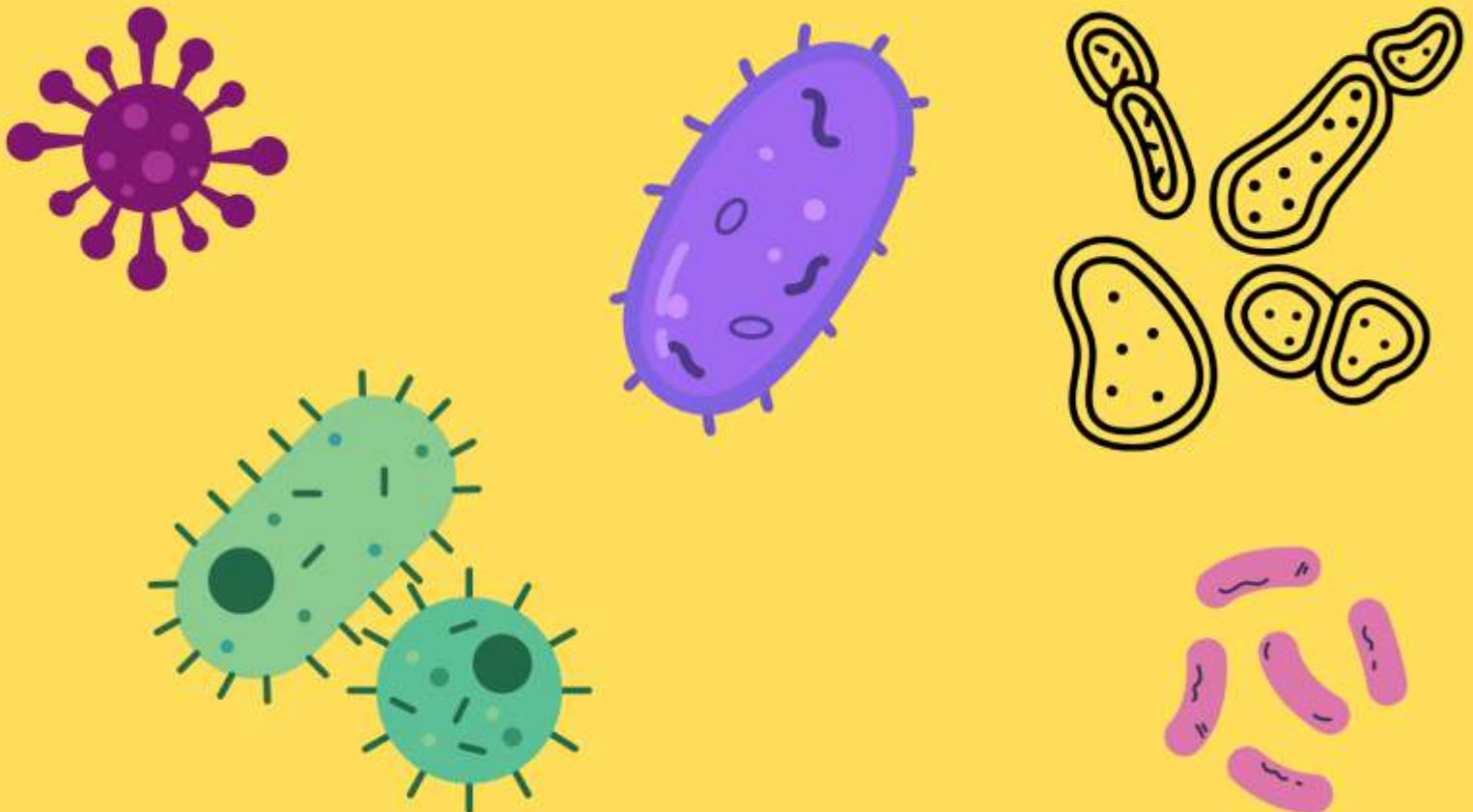


India is one of the largest milk-producing countries in the world, with dairy farming being a major source of livelihood for millions of rural households. However, the dairy industry in India faces numerous challenges, one of the most significant being the outbreak of zoonotic diseases. Zoonotic diseases are those that can be transmitted from animals to humans, and the dairy sector is particularly vulnerable to them due to the close interaction between animals and humans.

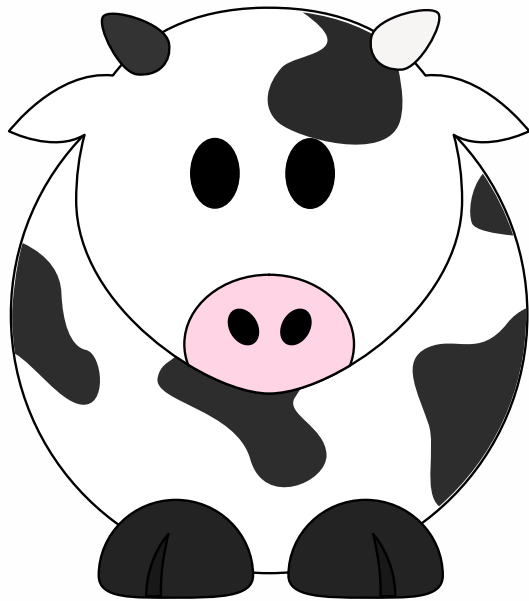
Zoonotic diseases in the dairy sector can have a significant impact

on both human and animal health, as well as on the economy. These diseases can lead to reduced milk production, increased morbidity and mortality in both animals and humans, and increased healthcare costs. In addition, outbreaks of zoonotic diseases can result in trade restrictions and loss of market access, which can have a devastating impact on the livelihoods of dairy farmers.

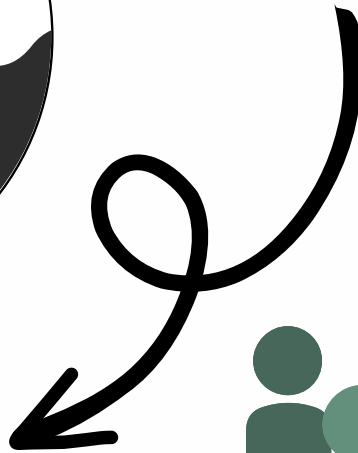
One of the most common zoonotic diseases in the dairy sector in India is brucellosis, which is caused by the bacteria *Brucella*. Brucellosis is a major public health concern as it







# Pathogens from animals to humans



## **Vector-borne**

Contact with a living organism that carries the disease pathogen

## **Direct Contact**

Coming into contact with the bodily fluids of an infected animal

## **Indirect contact**

Coming into contact with areas where animals live and roam, or surfaces that have been contaminated with pathogens

## **Foodborne**

Consuming infected food

## **Waterborne**

Drinking or coming into contact with contaminated water

can be transmitted to humans through consumption of contaminated milk or other dairy products, or through direct contact with infected animals. In animals, brucellosis can cause abortions, stillbirths, and reduced milk production, resulting in significant economic losses for farmers. In humans, brucellosis can cause fever, fatigue, joint pain, and other flu-like symptoms, and in severe cases, it can lead to chronic health problems.

Another significant zoonotic

disease in the dairy sector is leptospirosis, which is caused by bacteria of the genus *Leptospira*. Leptospirosis can be transmitted to humans through contact with contaminated urine or other bodily fluids from infected animals, particularly through exposure to contaminated water. In animals, leptospirosis can cause fever, reduced milk production, and reproductive problems. In humans, leptospirosis can cause fever, headache, muscle pain, and other flu-like symptoms, and in severe

cases, it can lead to kidney and liver damage.

The prevalence of zoonotic diseases in the dairy sector in rural India is further compounded by poor herd health management practices. Many small-scale dairy farmers lack the knowledge and resources to implement effective herd health management practices, such as regular vaccination, disease testing, and proper hygiene practices. As a result, diseases can easily spread within the herd and to humans.

To address the challenge of zoonotic diseases in the dairy sector in rural India, a multi-pronged approach is needed. Firstly, there is a need to raise awareness among dairy farmers about the risks of zoonotic diseases and the importance of implementing effective herd health management practices. This can be done through farmer training programs and extension services, which provide farmers with the knowledge and resources to implement effective disease control measures.

Secondly, there is a need to improve the quality of veterinary services in rural areas. Many small-scale dairy farmers in rural India lack access to affordable and quality veterinary services, which can result in delayed diagnosis and treatment of zoonotic diseases. Improving the quality and availability of veterinary services in rural areas can help prevent the spread of zoonotic diseases and reduce the economic impact of these diseases on dairy farmers.

Thirdly, there is a need for increased research and development in the area of zoonotic diseases in the dairy sector. This can help to identify new and emerging zoonotic diseases and develop effective control measures. Research can also help to identify the economic impact of zoonotic diseases on the dairy sector and inform policy decisions.

Dairy workers and farmers need to take several precautions to reduce the risk of zoonotic diseases. The first and most important step is to practice good hygiene. Dairy workers should wash their hands frequently, especially before eating or drinking. They should also wear gloves and protective clothing while handling animals or animal products.

Farmers should ensure that their animals receive proper vaccinations and deworming. They should also keep their animals in a clean and hygienic environment, with adequate ventilation and access to clean water and feed.

It is also important to monitor the health of the animals regularly. Any signs of illness or disease should be immediately reported to a veterinarian. Sick animals should be separated from the rest of the herd and treated promptly.

Farmers should avoid consuming raw or undercooked animal products, including milk, meat, and eggs. These products should be properly cooked or pasteurized before consumption to eliminate any harmful bacteria or viruses.

Zoonotic diseases are a significant risk in the dairy sector, particularly in rural areas where access to veterinary care and health services may be limited. It is important for dairy workers and farmers to take necessary precautions to prevent the spread of these diseases and protect their own health and the health of their animals. By practicing good hygiene, providing proper care and nutrition to animals, and seeking prompt medical attention for sick animals, we can reduce the risk of zoonotic diseases and create a safer and healthier dairy sector.

According to a study published in the *Indian Journal of Dairy Science*, Brucellosis and Tuberculosis are the most common zoonotic diseases found in Indian dairy farms. Both diseases can cause serious health problems in humans, including fever, fatigue, joint pain, and respiratory problems.

Brucellosis is caused by a bacterium called *Brucella abortus* and can be transmitted to humans through the

consumption of raw milk or contact with infected animals. It is a major problem in rural India, where raw milk consumption is common and animal health management practices are often poor.

Tuberculosis is caused by the bacterium *Mycobacterium tuberculosis* and can also be transmitted to humans through contact with infected animals or the consumption of raw milk. It is a serious public health problem in India, with an estimated 2.8 million cases in 2022 alone.

Apart from Brucellosis and Tuberculosis, there are many other zoonotic diseases that can affect dairy animals and pose a threat to human health. For example, *Salmonella*, *Campylobacter*, and *E. coli* can all be transmitted to humans through the consumption of contaminated milk or meat.

To prevent the spread of zoonotic diseases in the dairy sector, it is important to implement proper animal health management practices. This includes regular veterinary check-ups, proper vaccination, and strict hygiene measures.

In addition, it is important to educate farmers and dairy workers about the risks of zoonotic diseases and how to prevent them. This can include training on proper milking techniques, the importance of pasteurization, and how to identify and treat sick animals.

While zoonotic diseases pose a significant threat to public health, they can be effectively managed through proper animal health management practices and education. By taking these steps, we can ensure the safety of both dairy animals and the people who depend on them for their livelihoods.





Im hölzernen Butterkasten erfolgte die Rücklieferung von Butter für den Eigenbedarf



The dairy sector in India is that the country is the largest producer and consumer of dairy products in the world, with milk being a staple in the daily diet of millions of Indians. In fact, the annual consumption of milk and dairy products in India exceeds 100 million metric tons!





# Comedy is no Joke

India's rural dairy sector is one of the most interesting and comical aspects of the country. Cows are considered holy, so the farmers take good care of them, and there is a unique bond between the farmer and his cattle. But beyond the sanctity of the cow, there are many quirks and funny stories to be found in the rural dairy sector.

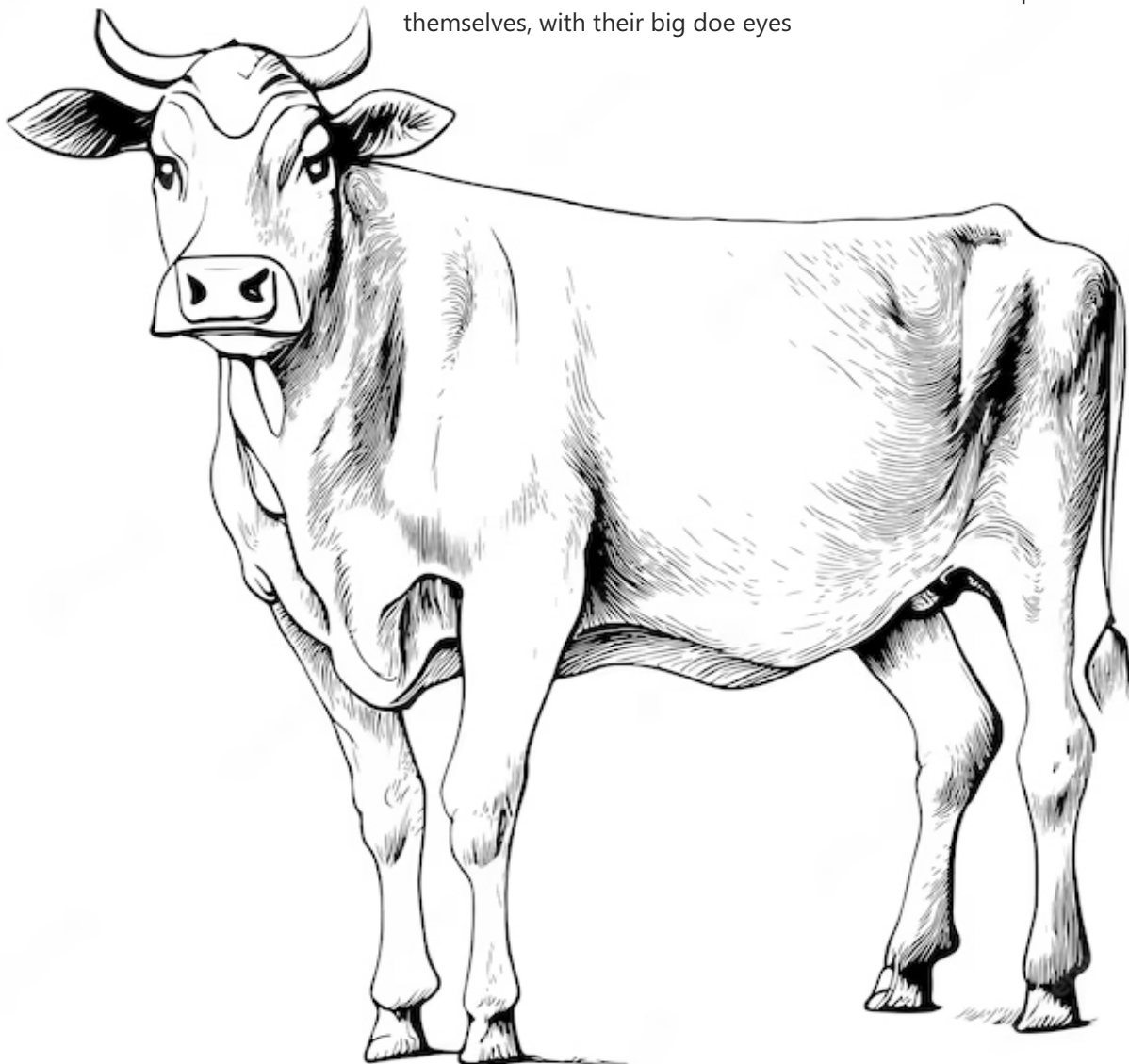
For example, the cows have a habit of wandering into people's homes and gardens, often causing a bit of a stir. But the farmers just shrug and say, "What can you do? They're just curious."

Then there are the cows themselves, with their big doe eyes

and gentle nature. They seem to have a certain intelligence about them, and many people believe that they can communicate with humans in their own special way.

There's the milk itself – fresh and delicious, straight from the cow. The farmers will proudly offer you a glass, insisting that it's the best you'll ever taste. And they're probably right.

The rural dairy sector in India is a beautiful and comical thing. It's a reflection of the country itself – full of quirks and surprises, but always grounded in a deep sense of tradition and respect.





# Professor Dairy

Scene: Professor Dairy, a dairy expert, is standing in front of a group of farmers including Mr. Common, who seems sceptical about herd health management.

Professor Dairy: Good afternoon, everyone! Today we're going to talk about the importance of herd health management in dairy farming.

Mr. Common: [sarcastically] Oh great, another lecture.

Professor Dairy: [smiling] I promise it won't be boring. Did you know that proper herd health management can significantly increase milk production?

Mr. Common: [sceptically] Really? How so?

Professor Dairy: By ensuring that your cows are healthy and free from diseases, you can increase their milk yield. Plus, healthy cows are happier cows.

Mr. Common: [jokingly] So you're saying that cows need a good doctor, just like us?

Professor Dairy: [laughing] Exactly! A healthy cow is a happy cow, and a happy cow means more milk in the bucket.

Mr. Common: [nodding thoughtfully] Well, I guess that makes sense. But how do we make sure our cows are healthy?

Professor Dairy: [explaining] Regular check-ups with a veterinarian, a balanced diet, clean and comfortable housing, and proper sanitation are all essential for herd health management.

Mr. Common: [surprised] Wow, I never realized that. Thanks, Professor Dairy!

[The group breaks up, and Mr. Common walks away smiling.]

Professor Dairy: [to himself] Another convert to the herd health management cause. One cow at a time, we'll change the world.





Media Release  
April 18, 2023



# Alltech's Dr. Aman Sayed Shares His Career Journey



Dr. Aman Sayed is the managing director of India and regional director of South Asia at Alltech. He earned his master's degree in veterinary (Poultry) science from Bombay Veterinary College and was honored with gold medal distinctions both at graduation and post-graduation. In the mid-2000s, through the work he completed during the last year of his master's program, he realized that there weren't enough veterinary specialists in the field and that customers were in dire need of professional assistance. This realization led him to begin pursuing roles in privately owned enterprises.

His journey began in the year 2000, with setting up an R&D

farm for an Iowa-based multinational firm, where he was later elevated to a technical position serving West India. In 2003, he joined Emirates Agriculture Technologies to oversee a free-range poultry project in Sharjah. He gained job experience in Dubai during his time in the Middle East and established Kentucky Equine Research's operations there, working in the equine racing industry.

The opportunity to join Alltech knocked on his door in 2005, and Dr. Sayed recalled that moment by saying, "It has been said that everything comes to you at the correct time and that you need to trust the process, and this exactly defines my career."

He initially had the chance to meet Alltech's creator, Dr. Pearse Lyons, in 2006. Dr. Sayed was profoundly impacted by his encounter with Dr. Lyons on multiple levels. Dr. Sayed has always been driven by and remains motivated by Dr. Lyons' philosophy that problems need to be proactively addressed as soon as possible rather than waiting for them to happen and then reacting. Dr. Lyons' advice inspired him to always go that extra mile and helped him land in his current position.

While working at Alltech, Dr. Sayed has learned that every day is a new day and a new beginning. He wants his team to maximize business growth and serve customers to the very best of their ability.

Over the course of more than 17 years with Alltech, Dr. Sayed has held a number of positions, rising from business development



manager to regional area manager for the business's poultry and dairy operations in West India. Later in his career, he took on the responsibilities of general manager of sales for North India and started to manage the markets in Bangladesh and Nepal. He eventually rose to the position of general manager for Poultry in India before being elevated to general manager of South Asia in 2012.

He has participated in numerous professional training programs, including the Alltech Mini-MBA program in collaboration with the University College Dublin Michael Smurfit Graduate Business School in Ireland, in addition to getting experience while managing Alltech's multispecies business unit. He gained knowledge from the course about the value of preserving an entrepreneurial attitude and being prepared to take financial risks in order to turn a profit.

As someone who serves in a decision-making role, Dr. Sayed has the responsibility of building a team of people who have a strong work ethic. He consistently assesses

team members based on three fundamental values: honesty, openness and diligence. He thinks that everyone who works for any company should uphold these fundamental values. A person's ethics and morals, a growth-focused attitude, and a high degree of engagement, both personally and professionally, can be seen in this trio of characteristics.

Over his 23-year career journey, Dr. Sayed has experienced both calm and rough waters while making challenging decisions related to driving business growth and profitability. To tackle these challenges, he has always strived to make unbiased decisions guided by the core principles of business growth – but he also endeavors never to neglect the human aspects of empathy, compassion and emotion.

In 2019, Dr. Sayed had a meeting with Dr. Mark Lyons, Alltech president and CEO, where the Indian Poultry Journalists Association posthumously honoured Dr. Pearse Lyons with a Lifetime Achievement Award. At the event, Dr. Mark Lyons spoke about Alltech's purpose of Working

Together for a Planet of Plenty™ and invited everyone to collaborate, across industry sectors and geographical boundaries, to create a place where animals, plants and people thrive in harmony.

"I am so delighted to be a part of this vision, which focuses on creating a world of abundance for future generations," said Dr. Sayed. "This mission continues to drive me to make a positive contribution, as the only way to do exceptional work is to enjoy what you do. I feel passionate and energetic about what I do at Alltech; it's what I live and breathe."

Dr. Mark Lyons has shared the proverb, "If you want to travel fast, go alone; but if you want to go far, go together." Dr. Sayed is a great supporter of teamwork above individual performance, and taking that route has gotten his team to where they are today. This motto makes him even more ambitious, and he hopes to serve in larger geographic areas in the future.

"Because of their sheer dedication and contributions to society and to my life, I will always be grateful to the Lyons family," said Dr. Sayed.

#### About Alltech:

Founded in 1980 by Irish entrepreneur and scientist Dr. Pearse Lyons, Alltech delivers smarter, more sustainable solutions for agriculture. Our diverse portfolio of products and services improves the health and performance of plants and animals, resulting in better nutrition for all and a decreased environmental impact.

We are a global leader in the agriculture industry. Our team produces specialty ingredients, premix supplements, feed and biologicals, backed by science and an unparalleled platform of services.

Strengthened by more than 40 years of scientific research, we carry forward a legacy of innovation and a unique culture that views challenges through an entrepreneurial lens. As a private, family-owned company, we adapt quickly to our customers' needs and focus on advanced innovation.

We believe agriculture has the greatest potential to shape the future of our planet. Our more than 5,000 talented team members worldwide share our purpose of Working Together for a Planet of Plenty™. Together, we can provide nutrition for all, revitalize local economies and replenish the planet's natural resources.

Headquartered just outside of Lexington, Kentucky, USA, Alltech serves customers in more than 120 countries, has five bioscience centers, and operates more than 80 manufacturing facilities across the globe.

For more information about Alltech India, visit [www.alltech.com/en-in](http://www.alltech.com/en-in).

## India not to import butter and other dairy products: Parshottam Rupala

Union Cabinet Minister of Fisheries, Animal Husbandry, and Dairying, Parshottam Rupala has made it clear that India will not be importing dairy products like butter. He also stated that the supplies used for the dairy industry will be improved with the help of a huge untapped domestic sector. "There is no truth in it (shortage of dairy products). No import will take place," Rupala, who is in charge of ministry of fisheries, animal husbandry and dairying, told reporters on the sidelines of an event.

He said there is no shortage of milk in the country and the government is regularly monitoring.

"The demand has increased. We have huge untapped area, we will try to tap that...We will manage it properly and there is no need to worry," he said and urged farmers and consumers not to worry about it.

On rise in retail prices of dairy products, the minister said there is no need to worry about the prices. Farmers are getting good rates.

The government, on 8th April, clarified reports regarding the possibility of import of certain dairy products by India amid speculations around the supply constraint for such items due to milk production remaining stagnant in the last fiscal.

Milk output in the country stood at 221 million tonne in 2021-2022, up 6.25 per cent from 208 million in the previous year, as per the official data.

Addressing a press conference, Singh had said the country's milk production remained stagnant in the 2022-23 fiscal due to lumpy skin disease in the cattle, while the domestic demand grew by 8-10 per cent in the period because of a rebound in the post-demand.

"There is no constraint in milk supply as such in the country... There is an adequate inventory of skimmed milk powder (SMP). But in the case of dairy products, especially fats, butter and ghee etc, the stocks are lower than the

previous year,' he had said.

The government will intervene to import dairy products like butter and ghee, if required, after assessing the stock position of milk in Southern states, where the flushing (peak production) season has started now, reported PTI citing Singh.

## NDDB calls meet of heads of cooperative dairy federations to sort out row over cross-border milk sale

The National Dairy Development Board (NDDB) will convene a meeting of Chairmen and Managing Directors of cooperative dairy federations in the country this month to sort out the sensitive issue of cross-border marketing of milk.

The meeting was called by NDDB Chairman Meenesh C. Shah, in response to serious objections raised by K.S. Mani, Chairman, Kerala Co-operative Milk Marketing Federation (KCMMF) over the issue at the meeting of National Cooperative Dairy Federation of India (NCDFI) held in Varanasi recently.

Earlier, KCMMF, known by the brand Milma, had voiced serious concern over Karnataka Milk Federation (KMF) foraying into parts of Kerala to sell its Nandini brand of liquid milk.

### Multifaceted issue

Making a strong pitch at the NCDFI meet, Mr. Mani said, "This is a complex and multifaceted issue as co-operative dairies have different priorities and interests". He further pointed out that by working together, co-operative dairies could find solutions that benefit all stakeholders and ensure the delivery of high-quality milk to consumers.

Mr. Mani emphasised that the co-operative dairies should approach this issue collaboratively and diplomatically, which will uphold the values of the co-operative movement.

A pressnote issued by Milma said the NDDB Chairman had responded to Mr. Mani's strong position on the matter by promising to convene a meeting of Chairmen and MDs of all co-operative dairy federations this month to discuss the issue and explore possible solutions to ensure that interests of all co-operatives were protected.

While raising concern over cross-border marketing, Milma had earlier pointed out that the input cost in Kerala is much higher compared to most other States. Also, in Karnataka, the government provides subsidy to the KMF, which is the prime reason for the cost difference between Nandini and Milma milk. Instead of passing on this benefit to its dairy farmers, KMF is utilising this advantage to sell its Nandini brand of milk at a lower price.

## Assam to launch its own dairy brand

GUWAHATI: To improve quality control and boost incentives for milk farmers, Assam is planning to launch a single brand name for milk, akin to Gujarat's 'Amul' and Karnataka's 'Nandini'. Chief Minister Himanta Biswa Sarma made the statement on the eve of the competition of two years with him in power in the state. Speaking to the media, Sarma stated that the state government would pay an additional ₹5 per litre of milk sold to dairy cooperatives over market rates. The procedure will reportedly begin on June 1, 2023. This action is intended to incentivise milk farmers around the state and increase milk production. Furthermore, to maintain quality control, all milk produced in the state will be sold under a single brand name. This will not only increase milk quality but will also establish a strong brand for Assam's dairy industry. The concept of a single milk brand name in Assam was inspired by successful models such as 'Amul' in Gujarat and 'Nandini' in Karnataka, as per media reports. These brands have not only been hugely successful in their particular areas, but they have also become household names across the country.

## Dairy stocks sizzle as temperatures soar. Time to milk gains?

Concerns over milk shortages amid soaring temperatures, when peak summer demand has just started to kick in, have given a fillip to dairy stocks over the last one month.

Shares of Heritage Foods have rallied 23% while those of Parag Milk are up 10% in anticipation of further price hikes, which could boost the margins of these companies. Moreover, it is given that the demand for milk and milk-related products, especially ice cream, will rise during the summer season.

"The recent uptick in dairy stocks is due to rising milk prices. In the last year, we have seen more than a 10% price hike in milk, and now ahead of the hot summer, the nation is suffering from some shortage in milk production as heat waves could impact dairy production," Anubhuti Mishra, Equity Research Analyst at Swastika Investmart told ETMarkets.

The demand for dairy products such as ice cream tends to rise during the summer months, which ultimately benefits the organized sector and listed dairy companies, Mishra added.

In the post-Covid era, consumers have shown a preference for packaged dairy products and this could spike as mercury is expected to heat up.

Most parts of India, except northwest and peninsular regions, are likely to experience above-normal temperatures from April to June, the India Meteorological Department (IMD) had said earlier this month.

"Historical financial data suggests the dairy companies' profitability and margins have declined on YoY and QoQ basis. If the dairy companies continue to increase the prices of their products in upcoming quarters, it will improve their margins and profitability in the long run," said Palka Arora Chopra, Senior Vice President, Mastertrust.

### Tough Competition

Several large unlisted players in the dairy industry in India, such as Amul, Mother Dairy and Nandini pose stiff competition to listed players. These large unlisted players have significant market share and brand recognition.

The listed players are generally placed well, as they have access to capital markets that can provide them with funding for growth and expansion, said Mishra, suggesting that listed companies must innovate, expand, and differentiate themselves from their competitors.

### Time to buy?

Despite sharp gains seen by some of the dairy stocks largely suggest investors to steer clear for them for the long run.

"Some kind of bottom fishing is happening in the market. The money flows has been checking for stocks that are fairly or undervalued and also chasing those stocks and sectors which have short-term momentum," said Kranthi Bathini of Wealth Mills Securities.

As dairy stocks could remain a seasonal play given the something temperatures in India, Bathini believes some of the outperformance in the short-to-medium-term is likely.

Mishra, meanwhile, said aggressive investors can benefit from the current rally by choosing the right stock. He, however, cautioned that the sector is cyclical and highly volatile.

"Though we are not very bullish about this sector due to the uncertainty involved in it, if one wants to take advantage of the current rally, then Heritage Foods can be a good pick," she added.

## Resiliency Helps Young Farmer Adapt After Tragedy

After a long stint in the ICU and after a five-hour back surgery, Sydni remains paralyzed from the waist down.

"Really, I didn't think this would happen

to me," she says. "I don't think anyone does."

Sydni has put in hard work and long hours to be able to return to college, using her wheelchair. She credits having a big support system and a great ag community that has inspired her to push forward.

"Just having the ag community behind me and hearing all their words of encouragement is wonderful," she recently shared with Karen Endres, the farmer wellness program coordinator with the Wisconsin Farm Center on their Rural Realities podcast.

### Community Impact

Sydni helped raise more than \$3,000 for AgrAbility of Wisconsin, which helps farmers and their families living with a farm injury, disability or limitation.

"This organization gives me so much hope," she says.

Thinking back to the accident, Sydni shared that farming can be a dangerous occupation and often focusing on what needs to get done combined with the routine of chores can have consequences.

"I forgot about the risks because I was on the bunker all the time" she says. "Just because you do it every day doesn't mean it's always going to be safe and that there are risks."

The young college student says she often thinks back to what happened on that April day, but her focus is directed to her future. One that she says will include cows.

"It will definitely include cows," she says. "I'm either going back to the farm or finding a job in the dairy industry."

### Wake-Up Call

Another thing that Sydni is certain about is the value of good friendships, which was illustrated greatly during the farming accident.

"Really just having people stick by you," she says. "Especially family who supported me and friends that helped me navigate college."

Sam, who was on the other side of the bunker the day of the accident, didn't see all that happened to his sister, but quickly jumped into action, helping



unravel her from the plastic and calling for help.

Now a junior in high school, Sam is also involved on the farm and in FFA, shared that before the accident he didn't think twice about risks on the farm, but now ever since he does. He also echoes his sister's sentiments about the love and appreciation for a great farming community.

"From the day it happened still to now, we had different farms offering to help," he shares and says people checked in, helped with yard work and whatever was needed to help out.

His sister's accident has been a wake-up call for Sam, as he shared that he looks at life differently now and accesses potential risks more now than ever before.

"I didn't really look at the risks as much as I'd like to say before the accident," he says. "Looking at the community showing their support, that they're behind us the whole way is appreciated."

#### **The World Isn't Built for Wheels**

Sydni shared that she never noticed where the elevators were, but now adapting to a life that requires a different mode of getting around has been an adjustment.

"Even going up to the barn which requires rolling up a hill on a gravel driveway is difficult," she says. "So, getting up there, I'm going to probably always need help because even with the motorized wheelchair, the gravel can make the wheels spin and I need someone to push me."

Back on campus, Sydni needs help getting over snowbanks in Madison and on a recent trip to Seattle, Washington with the UW Collegiate Farm Bureau, she shared they went to a restaurant that had stairs.

"One of the senior guys had to pick me up and carry me up two flights of stairs because their elevator was broken," she recalls. "That was really hard, like most farmers I have this stubborn personality and want to do everything for myself but now there is no way I can"

Although Sydni notes that through AgrAbility she has seen how technology and accessibility are going hand in hand

at the farm level.

"Through AgrAbility I have seen a lot," she shares that various equipment can be handicap accessible modified.

"Working cattle is always the hard part. I haven't really figured that out," she notes, but says that as time goes on, everything is likely to become more accessible.

## **Dairy unit making adulterated paneer busted in Chinchwad, goods worth over Rs 4.5 lakh seized**

A joint operation of the Pimpri-Chinchwad police and the Maharashtra Food and Drug Administration busted the unit located near Chittarao Ganesh Temple.

The Pimpri-Chinchwad police have, in a joint action with the Maharashtra Food and Drug Administration (FDA), busted a dairy unit allegedly manufacturing adulterated paneer in Chinchwad. The police seized large quantities of chemicals and oils, and blocks of manufactured adulterated paneer worth around Rs 4.66 lakh.

A team from the crime branch of Pimpri-Chinchwad police received a tip-off during their patrolling rounds that a unit named Maharashtra Milk Dairy, located near Chittarao Ganesh Temple, was involved in manufacturing adulterated paneer using milk powder and chemicals. A team led by Inspector Arvind Pawar initiated a probe.

"Based on the information received, a raid was conducted in coordination with the officials from the FDA. Two owners and four staffers at the manufacturing unit were running the unit. Large quantities of chemicals used for making adulterated paneer were seized along with manufactured blocks of suspected spurious paneer," said Deputy Commissioner of Police (crime branch) Swapna Gore.

The probe revealed that the unit was

manufacturing paneer using milk powder, palmolein oil, acetic acid, and an emulsifier named glyceryl monostearate (GMS). The police seized 140 litres of industrial-grade acetic acid, 60 litres of RBD (refined, bleached and deodorized) palmolein oil, 60 kg of GMS powder and 109 kg of paneer manufactured using these chemicals.

"Paneer was being manufactured using very harmful chemicals of industrial grade. The FDA officials sent the samples of the manufactured paneer for testing. Following the test results, the FDA will initiate further legal action," said Pawar.

A crime branch officer said, "We are appealing to citizens to report to us if they get information about manufacturing adulterated food items. For example, unadulterated paneer traditionally smells of good quality milk cream, is bright white, and is very soft. Adulterated paneer has no smell, is light yellow and very chewy. If citizens come across such doubtful food items, they can approach the police or the FDA, and action can be initiated after initial testing of the products."

## **Cross-border sale: Dairy Board calls co-op federations' meet to sort issue**

Earlier, KCMMF, known by the brand Milma, had voiced serious concern over Karnataka Milk Federation (KMF) foraying into parts of Kerala to sell its Nandini brand of liquid milk

The National Dairy Development Board (NDDB) will be holding a meeting of the chairman and managing directors of co-operative dairy federations of the country this month to sort out the sensitive issue of cross-border marketing of liquid milk.

The meeting has been called by NDDB Chairman Meenesh C Shah, in response to serious objections raised by K S Mani, Chairman of Kerala Co-operative Milk Marketing Federation (KCMMF) over the issue at a meeting of the National Cooperative Dairy Federation of India (NCDFI) held in Varanasi

recently, KCMMF said in a statement here on Thursday.

Earlier, KCMMF, known by the brand Milma, had voiced serious concern over Karnataka Milk Federation (KMF) foraying into parts of Kerala to sell its Nandini brand of liquid milk.

Making a strong pitch at the NCDFI meet, Mani said, "This is a complex and multifaceted issue, as co-operative dairies have different priorities and interests". He further pointed out that by working together co-operative dairies could find solutions that benefit all stakeholders and ensure the delivery of high-quality milk to consumers," according to the statement.

Mani emphasised that the co-operative dairies should approach this issue collaboratively and diplomatically, which would uphold the values of the co-operative movement, it added.

Responding to Mani's strong position on the matter, the NDDDB chairman said that a meeting of the chairman and MDs of all co-operative dairy federations would be called this month itself to take up the issue and explore possible solutions to ensure that the interests of all member-cooperatives are considered, the statement said.

While raising concerns over cross-border marketing, Milma had earlier pointed out that the input cost in Kerala was much higher compared to most other states.

"Also, in Karnataka, the government provides subsidy to KMF, which is the prime reason for the cost difference between Nandini and Milma milk. Instead of passing on this benefit to farmers, KMF is utilising this advantage to sell its Nandini brand of milk at a lower price," it added.

## **Cargill provides support to University of Idaho's Centre for Agriculture, Food and the**

## **Environment to advance more sustainable dairy farming**

Dairy sustainability scientists and innovators will soon have the nation's largest research hub to test their ideas and develop technologies in the Pacific Northwest. The Idaho Center for Agriculture, Food and the Environment (CAFE) will be the backdrop to short-term and longer-term research projects to benefit dairy farmers in Idaho and beyond. To help support this ambition, Cargill is donating \$500,000 to the University of Idaho.

Located in the nation's third-largest dairy-producing state and home to a thriving agriculture sector, CAFE is designed with the size and scale of a commercial dairy, with additional capabilities to grow and study crops used for animal nutrition. These researchers will examine the sustainability of the dairy farming value chain from feed to milk and beyond to help bring solutions to dairy farmers in the Western region for years to come. In addition, innovators will study additional revenue streams for farmers beyond milk from emerging bio-based products and carbon credit markets.

"Supporting the next generation of agriculture sustainability experts and the dairy farmers who will benefit from their advancements is important to our company," says Julie Abrahamson, commercial director for Cargill's animal nutrition business in North America. "We are making investments in projects like U of Idaho's CAFE because we believe in the future of the dairy industry."

"Idaho CAFE presents a viable farm-scale solution for conducting the research needed to address the sustainability of the dairy industry nationwide," said College of Agricultural and Life Sciences Dean Michael P. Parrella. "Cargill's investment in this effort underscores the critical need for the research-based solutions that will benefit dairy producers for generations to come. We could not do

this without their generous support."

The \$22.5 million multiphase project will begin milking its first cows by the end of 2024 and will house 2,000 cows when fully operational.

(Only the headline and picture of this report may have been reworked; the rest of the content is auto-generated from a syndicated feed.)

## **Madhya Pradesh: Adulterated khoya, ghee seized from Unhel Dairy Farm**

Acting on a tip-off on spurious milk-based products, food safety team conducted a raid at Maa Bhawani Dairy Farm on Pagaria Stand in Unhel town.

Food Safety officials raided a dairy farm at Unhel town of Ujjain on Tuesday night. The team seized adulterated khoya from the dairy.

Acting on a tip-off on spurious milk-based products, food safety team conducted a raid at Maa Bhawani Dairy Farm on Pagaria Stand in Unhel town. Team found that khoya was being manufactured by adding artificial flavors and vanaspati ghee.

On account of adulteration and sub-standard operations, team seized 231 kg tainted mawa, 17.6 litres vanaspati ghee and 10.58 kg cream from the spot, samples to be sent to state level food laboratory for testing

Food Safety Officer B D Sharma said that the action was taken following orders of Collector Kumar Purushottam. The license of dairy farm belonged to Rambabu Lavariya who was involved in food adulteration for long time.

Legal action would be taken against farm owner. Consumption of adulterated khoya and ghee could lead to fatal diseases. Raids were intensified in view of the wedding season. Stern action would be taken against dairy owners and shopkeepers found selling adulterated food items, he added.

## **14-Year-Old Registered Holstein**

## Breaks Record for Lifetime Milk

The record for most lifetime milk produced by a registered Holstein cow has been broken once again in 2023. This time by Nor-Bert Colby Connie, a 14-year-old Holstein owned by Nor-Bert Farm in Bremen, Indiana.

Connie achieved this incredible feat with her lifetime milk production record of 486,300 pounds through her latest completed lactation, surpassing the previous record holder's, Chrome-View Charles 3044, 478,200 pounds of lifetime milk.

Connie has equally impressive numbers for components, with a lifetime record of 27,062 pounds of fat and 17,737 pounds of protein through her last completed lactation. These tremendous fat and protein totals are currently the highest lifetime totals for fat and protein in the Holstein Association USA database. Chrome-View Charles 3044's components stood at 14,447 pounds of fat, and 12,576 pounds of protein.

AccoHer lifetime milk production total would also feed 10 people for over 80 years if each person had the daily requirement of 3 servings of milk per day. Connie could also provide the daily dairy requirements for 301,581 people for one day.

Connie is owned by Nor-Bert Farm in Bremen, Indiana. Roger and Deb Dankert farm alongside their son Jeremy Dankert and daughter and son-in-law Jennifer and Monty Freeman. Jennifer and Monty also have three children, Dalton, Dillon and Breanne, who are involved in the multigenerational farm.

The team at Nor-Bert Farm says Connie is a low maintenance-cow, who prefers being alone and doing her thing – making lots of high-quality milk. With a classification score of Excellent 94 3E, Connie is easy to pick out in the barn.

"She has open ribs, a big frame, and impressive width, with a really good udder on her," Jeremy shares. He believes these physical traits, along with good feet and legs, have also had a positive impact on Connie's ability to produce so much milk.

Connie continues to add to her record total, as the family states that she has recently calved again.

## Mother's Day Special: Supermom's dairy business uplifts Sitapur village, helps women afford kids' education

In 2021, Sudha Pandey not only won the Gokul Award but also the Nand Baba Award for preservation of indigenous breed cows, an achievement that reflects her dedication. Whoever coined the proverb "it takes a village to raise a child" probably didn't meet Sudha Pandey, the 'supermom' from Sitapur who not only looked after her four sons but also cows while ensuring that other women in the village had the financial capability to afford education of their kids.

A resident of Kunwarapur village, Pandey is now admired by people in the region for being an award-winning entrepreneur, a job provider and an activist for women empowerment. But her eyes gleam whenever she is praised as an excellent mother, who despite hardships, raised her sons and made them successful individuals.

While Pandey, in her early fifties now, never got a chance to study beyond primary level, she made sure that all her four sons got the right education. Besides taking care of their daily needs, she worked very hard to turn her small cowshed into an award-winning dairy business employing 11 women of the self-help group she formed in 2002.

Credit to her business acumen, she also started using the cow dung from her shed to make organic compost and sell it to farmers. Eventually, she also started selling cow urine. Due to her thriving business, Pandey has been conferred the Gokul Award, given for highest milk

production in the region, six times.

In 2021, she not only won the Gokul Award but also the Nand Baba Award for preservation of indigenous breed cows, an achievement that reflects her dedication.

"In 2002, I formed a self-help group with 11 other women to secure a loan under the Swarn Rozgar Yojana. However, it took us three years to get the loan as the bank employees were in two minds about our abilities to pay back the money. Once we got the loan, we started a dairy business," said Pandey while recounting the struggles she faced.

"However, we faced hurdles as there was no 'Khoya Mandi' (market for dried evaporated milk solids) in the region. Thankfully, we were able to tie up with Parag (a brand selling dairy products). The weekly payments we received from the brand helped us pay back the loan in time and afford the education of our children," she added.

Her eldest son (36) is a 'Pashu Mitra' at a government veterinary hospital while the second one (30) works for ICICI Bank. Her third son (26) works at IBM as a network engineer while the youngest (23) works for HDFC Bank.

"Initially, villagers didn't like that I was working outside. It was seen as a man's job. I would wake up at 4 am to feed the cows and prepare my kids for school. It was difficult to manage things with our meagre income but all along, I had this burning desire to change things for better. I believe that self-motivation helped me take care of kids and the cows as well," said Pandey whose husband Ram Naresh is a small-time farmer.

Recalling his childhood and the sacrifices his mother made for him and his brothers, Ashutosh, the youngest of four siblings, said, "In a way, our mother has strengthened the village economy. Several other women could contribute to their household income because of her. I remember how she would wake up before the crack of the dawn every day. It is almost superhuman to stick to such a rigorous routine. Even after all this, she never spent much on herself. We were always her priority. If not for her, we wouldn't be doing well in life."



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Iodine as POTASSIUM IODIDE	360 mg
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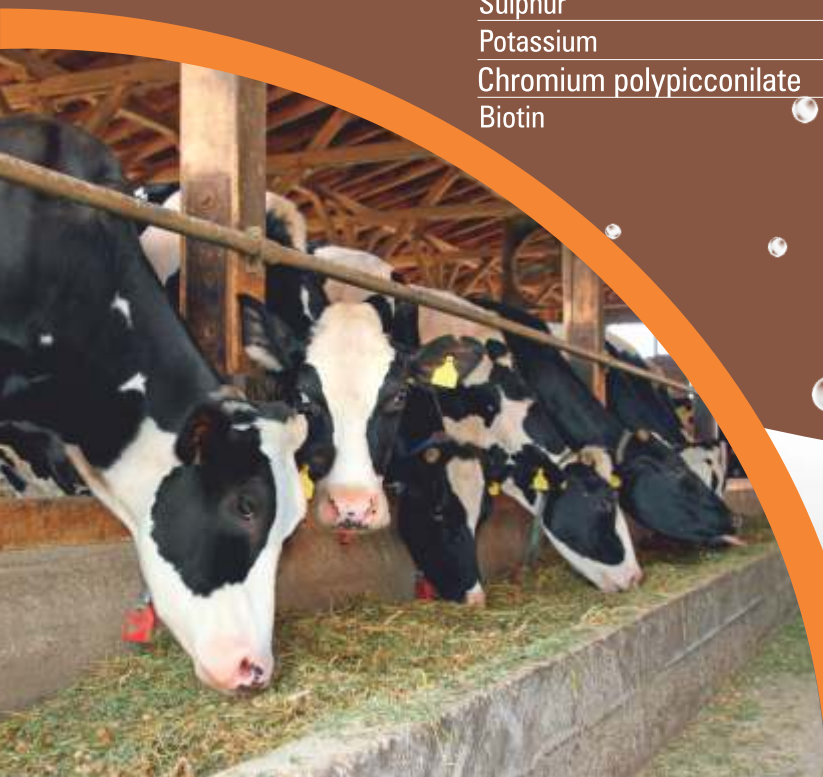
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# Editorial Calendar 2023

Publishing Month: <b>January</b> Article Deadline : <b>30<sup>th</sup>, Dec. 2022</b> Advertising Deadline : <b>3<sup>rd</sup>, Jan. 2023</b> Focus : <b>Climate Management</b>	Publishing Month: <b>February</b> Article Deadline : <b>30<sup>th</sup>, Jan. 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, Feb. 2023</b> Focus : <b>Nutritional Deficiency Effects</b>	Publishing Month: <b>March</b> Article Deadline : <b>28<sup>th</sup>, Feb. 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, March 2023</b> Focus : <b>Herd / Breed Management - Fertility, Breeding &amp; Reproduction</b>	Publishing Month: <b>April</b> Article Deadline : <b>30<sup>th</sup>, March 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, April 2023</b> Focus : <b>Disease Prevention/ Risk Assessment</b>
Publishing Month: <b>May</b> Article Deadline : <b>30<sup>th</sup>, April 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, May 2023</b> Focus : <b>Small Ruminants Management (Sheep, Goat etc)</b>	Publishing Month: <b>June</b> Article Deadline : <b>30<sup>th</sup>, May 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, June 2023</b> Focus : <b>Calf &amp; Heifer Management</b>	Publishing Month: <b>July</b> Article Deadline : <b>30<sup>th</sup>, June 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, July 2023</b> Focus : <b>Milk Production Management/ Milking Practices</b>	Publishing Month: <b>August</b> Article Deadline : <b>30<sup>th</sup>, July 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, August 2023</b> Focus : <b>Feed &amp; Fodder</b>
Publishing Month: <b>September</b> Article Deadline : <b>30<sup>th</sup>, August 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, September 2023</b> Focus : <b>Vaccination Protocols/ Cattle Herd Immunization</b>	Publishing Month: <b>October</b> Article Deadline : <b>30<sup>th</sup>, September 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, October 2023</b> Focus : <b>Dairy By-products</b>	Publishing Month: <b>November</b> Article Deadline : <b>30<sup>th</sup>, October 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, November 2023</b> Focus : <b>Potential of Dairy Farming</b>	Publishing Month: <b>December</b> Article Deadline : <b>30<sup>th</sup>, November 2023</b> Advertising Deadline : <b>3<sup>rd</sup>, December 2023</b> Focus : <b>Calf Management</b>

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For more detail, contact:



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 Bank address: Sector 12; U Estate Karnal  
 Account Type: Current  
 Account Name: Pixie Expomedia Pvt. Ltd.  
 Account Number: 120000991579  
 IFSC Code: CNRB0003264 | Swift Code: CNRBINBBFD | PAN No. AAMCP6787A

Date: \_\_\_\_\_ Company's Stamp & Signature

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For Any Query:

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