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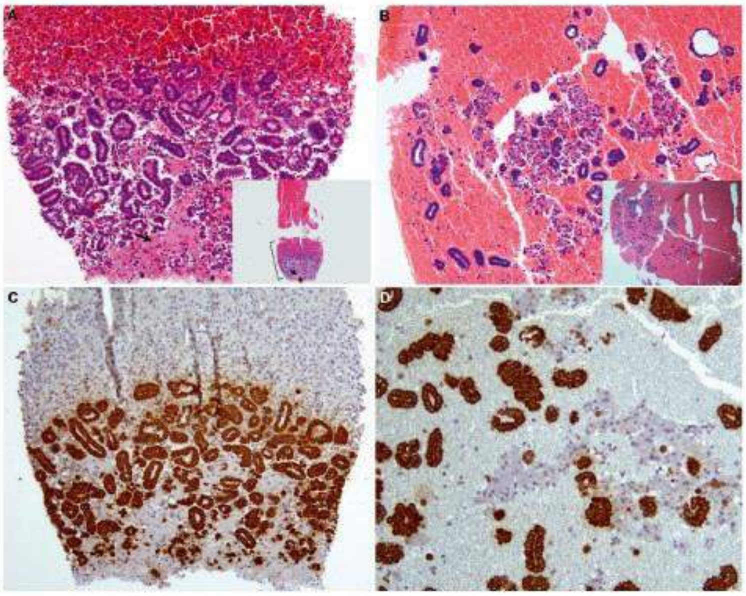

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Sustainable Strategies for the Agriculture of Today for a Better Tomorrow

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Abstract

Agriculture is a major need today in the current world scenario in terms of food security in order to feed the exponentially growing population. The farming systems of today are mainly focused on obtaining maximum yields to fetch maximum prices for the produce marketed, which seems clever enough to sustain our livelihoods, but is not ideal for the long-term conditions of the soil. In order to prolong and increase soil productivity and plant yield, as well as to nurture our current resources, we require various methods of cultivation which benefit us as well as conserve nature. The main focus of this article is with regard to the management of resources for agriculture and the various approaches to farming that are successful and realistic in achieving sustainability.

Key words: Sustainable agriculture, food security, soil productivity

Introduction

Sustainability is a seemingly laudable goal – it tells us we need to live within our means, whether economic, ecological, or political – but it's insufficient for uncertain times. How can we live within our means when those very means can change, swiftly and unexpectedly, beneath us?

-Jamais Cascio

India is home to approximately 1.38 billion people (According to Unique Identification Aadhar India, updated Dec 2020), which is around 17 percent of the world's total population. Even though there are a lot of sectors for employment, agriculture in the past used to be the primary occupation of the citizens, and more than business, it was service oriented. But presently, taking into account the number of farmers who are actually interested in their occupation and those who carry on the trend ancestrally from generation to generation, the proportion is unequal when compared to the large demand for farm products for consumption and industrial uses. Agriculture, on an average, accounts for around 20.2 percent of India's GDP (Gross Domestic Product) (Source: Statistics- Ministry of Agriculture & Farmers' Welfare). Though that is a significant contribution, it is not enough to sustain the exponentially growing population and cater to their livelihood needs in a timely manner.

The main agricultural product needed by an average Indian today is:

- *Year-round availability of cereals, vegetables and spices*: Tomatoes and onions are always in demand, and the prices are constantly fluctuating. This is due to the seasonal restriction of production and an imbalance in the regions where they are cultivated.
- *Secondary products made from processing agricultural produce include*: bread, fabric, sugar, rubber, and condiments. They are made from value-added products such as wheat, sugarcane, cotton, and spices.
- *Beverages are* made from plantation crops like tea, coffee, fruits, and fruit concentrates.

There are many more products for the needs of people, but the list could go on.

Now, for all these to be produced and made available throughout time, the radical source of agriculture, soil, is currently the target for instant and immediate attention.

Recently, due to indiscriminate resource use and callous anthropological activities, 30% of India's precious and fertile land has degraded, rendering it uneconomical (Kumar *et al.*, 2018). To avoid further consequences, and with future generations in mind, wise actions such as the following are suggested in specific to agricultural systems: to aid in sustainability, to effectively meet the needs of the current population, and to conserve existing resources and allow them to rejuvenate for the future. Given the prevailing scenario, with *soil as the main concern* in our minds, it is a must to monitor every decision taken on the use of the remaining resources.

1. Ideal water usage

The quality and quantity of water can have a major effect on the soil properties. Check the type of water incorporated into crops. For example, if the water is salty or contaminated, it could potentially cause problems in the soil structure like crusting, compaction, etc., which are not ideal for crop growth. Some knowledge can be acquired regarding this by doing a little research about how much of an actual quantity of water is required by a crop. There are stages where the crop needs water critically for survival. By connecting both of these, the water application on days where the crop does not need water can be reduced or avoided.

2. Pattern of cropping

When we work continuously for a long time, we tend to get exhausted, and when someone gives us something to do further, we need some refreshment, maybe a drink. The soil in which we cultivate has a similar response too. If too many exhaustive crops like maize and rice are grown, the energy of the soil to supply nutrients to the crops drops, and it is a problem for the soil as well as the crop grown (Kannan et al., 2013).

To deal with this smartly, there are certain systems which give the soil a break from constant toil and boost its potential.

- **Intercropping:** Crops which feed the soil, called "legumes" such as pulses (peas, beans, and grammes), can be grown in between rows of the crops that consume the soil's energy to balance the release and receipt of nutrients (Mousavi & Eskandari, 2014).
- **Alley/hedge cropping:** growing commercial crops among trees. The vegetation holds and preserves the soil structure by strong root establishment.
- **Shelterbelts:** Trees can be grown on the borders of fields, which cut off strong draughts of wind and indirectly prevent soil erosion and flooding as well (Carroll, 2004).

3. Feed soil to feed humans

Earlier, in our olden days, there was soil-threatening practices being followed like *Shifting cultivation,* where after the harvest of each crop, the residue used to be burnt on the soil itself. Later when studies were carried out, the effect of this practice was proven to deplete majority of the nutrients of the soil, as well as affect the soil biological activity, impacting the fertility level. Natural customs such as planting crops or trees can be done to replenish soil nutrients, and different other sources such as the following can invigorate the soil more efficiently and quickly.

Organic mulch: use leaves/stubble from previously cultivated crop along with other natural based waste from domestic sources to spread a layer on the soil to keep it moist and enhance biological activity, which in return gives us higher productivity and yield. It also serves the purpose of natural weed control (Saeed Shojaei *et al.*, 2020).

Biofertilizers and plant growth promoting bacteria: There are so many benefits that can be acquired from such little microbes, such as *Azospirillum, Rhizobium* and *Azolla.* They not only serve as boosters for soil fertility, but also improve plant nutrient uptake and yield (Brahmaprakash and Sahu, 2012).

4. Precision agriculture

This is the hot topic of today while we face the crisis of water scarcity in many regions of India. Precision agriculture deals with the application of water and nutrients from the right source, at a precise rate, at the right time. This system might be a little expensive for rural farmers of India, but once the expenditure is made, it justifies its worth.

5. Protected cultivation

This is the best solution is for areas with an undesirable climate and not-so-appropriate soil conditions. Construction of structures such as greenhouses, polyhouses and shade nets with designed components such as UV stabilised sheets, sensors and environment regulating systems can take current day agriculture to the next level. They are in high demand and pose no pollution risk Most of the crops can be produced throughout the year, and degraded land can be utilised economically (Reddy, 2016).

Methods of Sustainable Agriculture

1. Crop Rotation

Crop rotation is one of the most powerful techniques of sustainable agriculture. Its purpose is to avoid the consequences that come with planting the same crops in the same soil for years in a row. It helps tackle pest problems, as many pests prefer specific crops. If the pests have a steady food supply, they can greatly increase their population size. Rotation breaks the reproduction cycles of pests. During rotation, farmers can plant certain crops, which replenish plant nutrients. These crops reduce the need for chemical fertilizers.

2. Permaculture

Permaculture is a food production system with intention, design, and smart farming to reduce waste of resources and create increased production efficiency. Permaculture design techniques include growing grain without tillage, herb and plant spirals, hügelkultur garden beds, keyhole and mandala gardens, sheet mulching, each plant serving multiple purposes, and creating swales on contour to hold water high on the landscape. It focuses on the use of perennial crops such as fruit trees, nut trees, and shrubs all together to function in a designed system that mimics how plants in a natural ecosystem would function (Krebs, 2018).

3. Cover Crops

Many farmers choose to have crops planted in a field at all times and never leave it barren. This can cause unintended consequences. By planting cover crops, such as clover or oats, the farmer can achieve his goals of preventing soil erosion, suppressing the growth of weeds, and enhancing the quality of the soil. The use of cover crops also reduces the need for chemicals such as fertilizers.

4. Soil Enrichment

Soil is a central component of agricultural ecosystems. Healthy soil is full of life, which can often be killed by the overuse of pesticides. Good soils can increase yields as well as help create more robust crops. It is possible to maintain and enhance the quality of the soil in many ways. Some examples include leaving crop residue in the field after a harvest, and the use of composted plant material or animal manure.

5. Natural Pest Predators

In order to maintain effective control over pests, it is important to view the farm as an ecosystem as opposed to a factory. For example, many birds and other animals are, in fact, natural predators of agricultural pests. Managing your farm so that it can harbour populations of these pest predators is effective as well as a sophisticated technique. The use of chemical pesticides can result in the indiscriminate killing of pest predators.

6. Bio intensive Integrated Pest Management

Integrated Pest Management (IPM) is an approach, which essentially relies on biological as opposed to chemical methods. IMP also emphasizes the importance of crop rotation to combat pest management. Once a pest problem is identified, IPM will ensure that chemical solutions will only be used as a last resort. Instead, the appropriate responses would be the use of sterile males and biocontrol agents such as ladybirds (Bruce, 2007).

7. Polyculture Farming

This technique is similar to crop rotation that tries to mimic natural principles to achieve the best yields. It involves growing multiple crop species in one area. These species often complement each other, which helps to produce a greater diversity of products on one plot while fully utilising available resources. High biodiversity makes the system more resilient to weather fluctuations, promotes a balanced diet and applies natural mechanisms for maintaining soil fertility (Baker, 2017).

8. Agroforestry

Agroforestry has become one of the powerful tools of farmers in dry regions with soils susceptible to desertification. It involves the growth of trees and shrubs amongst crops or grazing land, combining both agriculture and forestry practices for long-lasting, productive, and diverse land use when approached sustainably. Trees have another important role in maintaining a favorable temperature, stabilizing soils and soil humidity, minimizing nutrient runoff, and protecting crops from wind or heavy rain. Trees in this farming system are additional sources of income for farmers with the possibilities for product diversification.

9. Biodynamic Farming

Biodynamic farming incorporates ecological and holistic growing practices based on the philosophy of "anthroposophy." It focuses on the implementation of practices such as composting, application of animal manure from farmed animals, cover cropping, or rotating complementary crops to generate the necessary health and soil fertility for food production. Biodynamic practices can be applied to farms that grow a variety of produce, gardens, vineyards, and other forms of agriculture.

10. Better Water Management

The first step in water management is the selection of the right crops. Local crops that are more adaptable to the weather conditions of the region are selected. Crops that do not demand too much water must be chosen for dry areas. There should be well-planned irrigation systems; otherwise, other issues like river depletion, dry land and soil degradation will develop. The application of rainwater harvesting systems by storing rainwater can be used in drought conditions. Apart from that, municipal wastewater can be used for irrigation after recycling.

Conclusion

Agriculture is the centrepiece of the Indian economy as it is the parent of all the secondary resources and products, and the resources of the planet are the greatest offering of nature to its residents. Refraining from practises that contribute to the destruction of existing natural resources, and rethinking conventional ways of farming with the goal of thrift for the future, can be the best way to repay what nature has gifted us. Social, economic, and environmental sustainability are closely intertwined and necessary components for truly sustainable agriculture. For example, farmers faced with poverty are often forced to mine natural resources like soil fertility to make ends meet, even though environmental degradation may hurt their livelihoods in the long run. Only by creating policies that integrate social, environmental, and economic interests can societies promote more sustainable agricultural systems.

Note: On visiting a farm near Dharmapuri district, a sustainable agricultural system was being practiced: drip irrigation system in tomato cultivation to conservatively use water, and shelterbelts of *Prosopis juliflora* trees to protect the standing crop from strong winds.

References

Baker, B (2017). Can modern agriculture be sustainable? Perennial polyculture holds promise. BioScience, 67(4): 325-331.

Brahmaprakash, G.P. and Sahu, P.K (2012). Biofertilizers for sustainability. Journal of the Indian Institute of Science. 92(1): 37-62.

Bruce, T.J., Hooper, A.M., Ireland, L., Jones, O.T., Martin, J.L., Smart, L.E., Oakley, J. and Wadhams, L.J (2007). Development of a pheromone trap monitoring system for orange wheat blossom midge, Sitodiplosis mosellana, in the UK. Pest Management Science: formerly Pesticide Science. 63(1): 49-56.

Carroll, Z.L., Bird, S.B., Emmett, B.A., Reynolds, B. and Sinclair, F.L (2004). Can tree shelterbelts on agricultural land reduce flood risk?. Soil use and Management. 20(3): 357-359.

Kannan, R.L., Dhivya, M., Abinaya, D., Krishna, R.L. and Krishnakumar, S (2013). Effect of integrated nutrient management on soil fertility and productivity in maize. Bulletin of Environment, Pharmacology and Life Sciences. 2(8): 61-67.

Krebs, J. and Bach, S (2018). Permaculture—Scientific evidence of principles for the agroecological design of farming systems. Sustainability. 10(9): 3218.

Kumar, B.P., Babu, K.R., Rajasekhar, M. and Ramachandra, M (2019). Assessment of land degradation and desertification due to migration of sand and sand dunes in Beluguppa Mandal of Anantapur district (AP, India), using remote sensing and GIS techniques. Journal of the Indian Geophysical Union. 23(2): 173-180.

Mousavi, S.R. and Eskandari, H (2011). A general overview on intercropping and its advantages in sustainable agriculture. Journal of Applied Environmental and Biological Sciences. 1(11): 482-486.

Reddy, P.P., 2016. Sustainable crop protection under protected cultivation (No. BOOK). Singapore: Springer.

Yang, M.M., Wang, J., Dong, L., Teng, Y., Liu, P., Fan, J.J. and Yu, X.H., 2017. Lack of association of C3 gene with uveitis: additional insights into the genetic profile of uveitis regarding complement pathway genes. Scientific reports. 7(1): 1-8.

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Nutritional Management of Bloat

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Abstract

Bloat or excessive gas production is one of the common disease occur in ruminants. This is most commonly found in high yielding cross bred animals. It is most prevalent in periparturient or transition period. Due to sudden change in feeding practices of the animals, this disease may occur leading to high mortality in animals. Emergency treatment is usually practised by the veterinarian to cure the disease and save the life of the animals. Nutritional management is one of the important tools in preventing the disease in field condition. Strategies like maintaining a balance feeding strategy, controlled grazing condition, application of ionophore antibiotics *etc.* can be used to prevent bloat and provide the economic benefit to the farmers.

Introduction

Bloat is a complex disease that is difficult to predict under field conditions. It is solely a disease of ruminants (Cattle, Buffalo, Goat and Sheep). It results either excessive production of gas or physical obstruction of the processes of eructation of gas. Bloat is a clinical condition where rumen and reticulum are filled with gases of fermentation due to excessive intake of easily fermented food. If gas bubbles remain intimately adhered with ingesta the condition is referred as frothy bloat as there is lot of production of foam with in rumen. It is a continuing hazard to cattlemen due to its unpredictable occurrence. A cattle may have no bloat for a period of years and then unexpectedly have a significant death loss before appropriate preventive or therapeutic measures can be applied. Bloat often occurs when cattlemen aim for high productivity. Thus, the fear of bloat often presents a limitation to the level of production. Several investigations have shown the bloat reduces animal productivity, primarily by reducing feed intake. Skilful management is a key element in bloat prevention and one often hears the opinions that bloat occurs when management is poor. Good management reduces the chances for occurrence of bloat but in view of the complex nature of the condition it is impossible to predict when bloat will occur and even with the best management, bloat presents a danger at high levels of productivity.

Types of bloat

There are basically two types of bloat found in ruminants

1. Frothy bloat: it is caused due to :

- Excessive intake fermentable soluble carbohydrate
- Feeding of excessive immature plant
- Grazing in lush green pasture.
- Excessive intake of soluble carbohydrate.
- Lack of fibrous food in the ration.
- Fodder containing more calcium, protein, magnesium.
- Excessive feeding of bloat causing plants like alfa alfa, red cloves and white clover *etc*.

In primary or frothy bloat, eructation does not occur. Excessive intake of highly fermentable rapidly digestible leguminous plants is the most important cause of froathy bloat

2. Free-gas bloat: it is caused by physical obstruction of eructation process due to:

- Choke of oesophagus
- Stenosis of oesophagus
- Pressure on oesophagus from outside due to enlarged lymph node, neoplasia, tubercular growth and papilloma *etc*.
- Vagus indigestion
- Traumatic reticulo peritonitis
- Hydatid cyst
- Rumenitis and oesophagitis
- Diaphragmatic hernia
- Hypocalcemia
- Nervous disorder preventing normal contraction of rumen wall.

Clinical findings of bloat

- Generalized enlargement of abdomen. It is more obvious in left paralumbar fossa.
- Sign of colic manifested by kicking at the belly, looking at the flank or rolling on the ground.
- Continuous champing of mouth and grinding and teeth.
- Tympanic or drum like sound on percussion of left paralumbar fossa. Crepitating sound may be heard on palpation.
- Extension of head and neck and protrusion of tongue.
- Marked dyspnoea embraced with mouth breathing salivation and abducted elbow.
- Tachycardia (more than 120 per minute).
- Ruminal motility goes high initially followed by hypomotility later on atony.
- pH of ruminal fluid is acidic in nature.
- Thoracic type respiration
- Mostly incomplete anorexia.

Haemato biochemical changes in bloat

Frothy bloat causes decreased in packed cell volume (PCV) and total red blood cells (TRBCs). Total white blood cells (TWBCs) were increased in cases of frothy bloat. Increased in Neutrophils, monocytes and decrease of lymphocytes and Eosinophiles was noticed in frothy blood (Baraka *et al.*,2000; Saber, 2016). Similarly, Frothy bloat increases serum total protein and decreased sodium and potassium levels (Kamal, 2008; Baraka *et al.*, 2000).

Nutritional Management of Bloat

Selection of forages:

Cultivation and feeding of cereal and legume grass mixture is the most economical method of reduction of bloat in ruminants. In a grass mixture the content of legume should be less than 50%. If a cattle choose only legumes the chance of occurrence of bloat increases, so proper chaffing of the grass mixture can prevent bloat in ruminants.

Field and grazing management:

Controlled grazing and application of fertilizer may be one approach for reduction of bloat in animals. Grazing of animal in both cereals and legume grasses reduces the occurrence of bloat than legumes alone. Similarly, grasses grown in sandy soil and drought prone soil causes less bloat in ruminants. Dew management in growing fodder can be used as a tool for reduction of bloat. Dry of dew spread on legumes is a common practice in prevention of bloat. Exposure of animals to grazing land during afternoon time reduces the chance of bloat than morning.

Anti-foaming agents:

Addition of oil and detergent in the diet of animals prevents bloat due to reduction of frothy condition. Commonly used vegetable oil like soya oil prevents in bloat in grazing animals. Similarly, bloat guard containing detergent like poloxalene is helpful for preventing bloat in animals.

Antibiotics:

Monensin, lasalocid and other ionophore antibiotics prevents bloat due to alternation of rumen microbial system. They disturb the permeability of the rumen microbes causing disruption in normal cellular metabolism of microbes, thereby preventing the gas production. Monensin @ 300mg/head/day for 100 days may be fed to prevent bloat in susceptible animals.

Common nutritional practices for bloat:

- Ration should contain at least 10-15% chopped roughages.
- Grain should be cracked or rolled but never be pulverised or finely ground.
- Tallow may be added in the ration @ 3-5% of the ration.
- Lasalocid may be added in the ration @ 0.66-0.99mg/kg ration.
- Addition of hay upto to 15% of ration dry matter may be useful in prevention of bloat.
- Coarse grinding of concentrate is an important tool for prevention of bloat than fine grounded concentrates.

Treatment

Emergency treatment:

Trocarisation should be made with wide long needle or with trocar cannula. Cannula should be retained for some time to release the gas and upon to relief from gaseous pressure. It is done in the centre of paralumbar fossa. Stomach tube or probang can be used to remove excess gas from the rumen.

Medicinal treatment:

- Carminative mixture or antacid preparation
- Turpentine oil and linseed oil
- Aqueous preparations of Sodium bicarbonate: 15- 30 ml(large ruminants), 2-5 ml (small ruminants)
- 500 ml to 1litre of liquid paraffin orally in adult cattle or buffalo.
- Dimethicone suspension (bloatosil, bloatonil).
- Antibiotic

Conclusion

Bloat is a commonly occurring disease in ruminants which can be prevented with appropriate feeding behaviours along with various nutritional managements.

References

Baraka, T. A., et al. "Clinical studies of selected ruminal and blood constituents in dromedary camels affected by various diseases." *Acta Veterinaria Brno* 69(1): 61-68. (2000).

Saber, M. "Effect of Field and Experimentally-induced Cases of Frothy Bloat on Physical Examination, Rumen Fermentation Pattern and Blood Constituents in Baladi Egyptian Sheep." *Int. J. Livest..Res.* 6: 46-63 (2016).

Kamal, A.M. Some Biochemical, Hematological and Clinical Studies of Selected Ruminal and Blood Constituents in Camels Affected by Various Diseases. *Res. J. Vet. Sci*, 1(1):16-27(2008).

One Health Approach to Tackle Future Pandemics in India

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Abstract

The ongoing COVID-19 pandemic has prompted Indian policy makers to emphasize on "One Health" approach by encouraging intersectoral collaboration, transdisciplinary association, data sharing, and cooperation across various disciplines. The OH principle must be visualized outside of the context of zoonoses. To prevent future pandemics, a proper logical operational plan within the country is required. In this article, we outlined the foundation strategy of the One Health Concept that should be implemented in order to avoid future pandemics.

Key words: One Health, Pandemic, Zoonotic diseases, Future Strategies, Public Health

Introduction

Father of Modern Epidemiology, Calvin Schwalbe proposed that human and veterinary professions should unite to fight against zoonotic diseases, and now in 2021 this concept is very much emphasized, as we face the COVID -19 pandemic. Therefore we must come up with a solution to save mankind from the fear of a disease that would put pressure on people to stay within their homes and lose jobs due to economic implications. In developing nation like India, it becomes mandatory to have an approach for immediate identification of cause at the first point and sometimes this requires a prompt and effective effort by the departments dealing with public health under one umbrella, referred to as the **"One Health"** Concept.

According to the One Health commission, it is a collaborative effort by multiple disciples to obtain optimal health for people, animals and our environment. It is focused mainly on emerging diseases, national food security, environmental stability and antimicrobial resistance.

Why India

South Asia has been known to be a major hotspot for infectious disease. Therefore, it is quite possible that India could be a global threat in the coming future. Owing to this, our preparedness to tackle this has to be strong enough to save the world from another COVID - 19 pandemic like situation, starting from basics such as source tracing, surveillance and testing, that would eventually help us in making science-based decisions to reduce the disease burden. Investing in One Health could easily save billions as compared to the money spend on zoonotic disease outbreak response worldwide.

Thus the need of the hour is to endorse this concept as India's national priority for public health security as well as economic gains.

Transboundary diseases

Studies indicate that nearly 75% of the emerging infectious diseases in humans are zoonotic. Diseases such as Ebola virus disease (Democratic Republic of Congo) - 1976, Avian influenza (China) - 1997, Nipah virus (Malaysia) – 1998, Severe acute respiratory disease (China) - 2003, Middle East respiratory syndrome (Saudi Arabia) - 2012 and the ongoing COVID - 19 are having foreign origin which triggers Indian authorities to have an effective One Health policy for country's security by issuing proper guidelines for movement at all entry points of the country.

India's Framework

India's 'One Health' vision derives its roots from tripartite comprising World Health Organization (WHO), Food and Agricultural Organization (FAO) and World Organization for Animal Health (OIE). At present Indian government under the Department of Animal Husbandry and Dairying (DAHD) has launched National Animal Disease Control Programme for Foot and Mouth disease and Brucellosis control and will soon establish a 'One Health' unit within the Ministry. Assistance to States for Control of Animal Diseases (AS-CAD) is also being provided by upgrading disease diagnostic systems. India accounts for 97% of human rabies cases associated with dogs. Therefore disease management in dogs is necessary. DAHD along with the Ministry of Health and Family Welfare is also working on National Action Plan for Eliminating Dog Mediated rabies by mass vaccination and public education to make the nation rabies-free by 2030.

Success in existing System

It is this "One Health" approach that paved the way to discover the source of Kyasanur Forest Disease (FKD) in 1950 by the combined efforts of Virus Research Centre (National Institute of Virology) Pune, the World Health Organization and the Bombay Natural History Society.

Kerala model (2018), local authorities reacted quickly and efficiently to tackle Nipah Virus Outbreak and successfully managed to confine it to 23 cases.

National Mission on Biodiversity and Human Well being also aims to link biodiversity with human health through One Health framework that would further strengthen this concept.

Flaws in existing system

The condition of our fragile 'health care system' as witnessed by the whole nation during the second wave of the COVID – 19 pandemic is very week. Various flaws in the existing system are needed to be addressed, starting from individual, research to centre level. Students in school are never taught about the human-animal-environmental relationship in terms of a potential source of zoonotic threat to them. Mass awareness campaigns regarding food hygiene are lacking. Lack of collaboration between foreign and research institutions of the country. No central authority to resolve overlapping matters related to human and animal health. No well established Task force in case of a 'One Health Emergency'

Future strategy

Inter-ministerial Task Force

Currently, nation needs focus on the improvement of the existing framework along with subsequent extensions in lateral approach in the form of **inter - ministerial Task Force.** Department of Biotechnology under the Ministry of Science and Technology should act as a One Health Task Force. If it succeeds, all the essential ministries can be brought under its umbrella. Establishment of One Health Clinics, in the areas of high human-animal density is a must. Joint One Health training programs for both health care workers as well as paravets should be conducted.

Collaboration

Collaboration between top research institutes and surveillance systems should be emphasized upon. At research level, Indian council of Medical Research (**ICMR)** and Indian Council of Agricultural Research **(ICAR)** needs to collaborate in terms of data and resource sharing. Human (**Integrated Disease Surveillance Project**) and animal disease **(National Animal Disease Reporting System)** surveillances programmes are already in place within the country, it is essential to develop strategies to integrate these two-surveillance systems and prepare a roadmap for One Health surveillance within the country.

Data Sharing

Top epidemiologists throughout the world suggest that a **website or database** for systematic data collection and sharing is a must so that experts could easily suggest preventive majors to control the outbreak and give suggestions in policy making. Data regarding vaccination in highly populated country like India should also be made available on open sources so those vaccine rolls out plans are made to save the vulnerable age group first.

Intersectorial association

Integrated efforts by combining human, animal and environmental sectors can help in tracing the pathway of pathogen entry from its wild origin to humans and focus on prevention of disease at the source itself.

Conclusion

At last, effective implementation of One Heath concept requires strong political will, policy making, resource sharing, capacity building, collaboration between different sectors and general awareness among the masses. An immediate shift in the national policy to strengthen the interconnection between different sectors along with a logical programmatic plan has to be implemented. Every **year November 3rd**, **One Health Day** should be celebrated with great enthusiasm to increase awareness of One Health concept and save the world from the challenges of future.

References

Asaaga, F.A., Young, J.C., Oommen, M.A., Chandarana, R., August, J., Joshi, J., Chanda, M.M., Vanak, A.T., Srinivas, P.N., Hoti, S.L., Seshadri, T., and Purse, B. V. 2021. Operationalising the " One Health " approach in India : facilitators of and barriers to effective cross-sector convergence for zoonoses prevention and control. *BMC Public Health,* **21**(1517): 2-21

Mackenzie, J.S. 2019. The One Health Approach — Why Is It So Important ?. Tropical Medicine Infectious Disisease, **4**(88): 5–8.

Yasobant, S., Bruchhausen, W., Saxena, D., and Falkenberg, T. 2019. One health collaboration for a resilient health system in India: Learnings from global initiatives. *One Health* **8** (June): 100096.

Sukumaran, A., and Pradeepkumar, A.S. 2015. One Health approach: A platform for intervention in emerging public health challenges of Kerala state. *International Journal of One Health* **1**: 14–25.

Acharya, K.P., Subedi, D., and Wilson, R.T. 2021. Rabies control in South Asia requires a One Health approach. *One Health* **12** (September 2020): 100215.

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Short communication

Ultrasonographic diagnosis and surgical removal of unusual palpebral conjunctival coenurus cyst in a kid

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Abstract

A seven month old female kid was presented with bulging of right upper eyelid. Through clinical examination was performed and Trans-palpebral ultrasound examination revealed cyst. The circumscribed cyst was removed following a stab incision on mid of palpebral conjunctiva under local analgesia. Microscopic examination confirmed the coenurus cyst. The kid made an uneventful recovery.

Keywords: coenurus cyst, kid, palpebral conjunctiva, ultrasonography

Introduction

Sheep and goat are frequently affected with Coenurosis disease. In addition to its zoonotic impact, high economic losses in farms are also a noticeable effect of coenurosis. *Coenurus cerebralis* is a principal cause for nervous manifestations due to manifestation in the Central nervous system (Desouky et al., 2011). Further, it is also noted in wild and domestic canids mostly in the larval form of the Taenia multiceps gaigeri that causes non-cerebral coenurosis (Sharma and Chauhan 2006). The most common site/location of the warm reported are the shoulder, gluteal, kidney, neck muscle, heart, genital system, rectum and urinary bladder (Varma and Malviya 1989), retro-bulbar eye (Sharma et al.,2017),lower eyelid (Raidurg and Reddy 2009), peri-orbital of domestic goats (Aher et al.,2018). Ultrasonographical diagnosis and surgical management has been described by Biswas (2013). Unusual palpebral conjunctival coenurus cyst's surgical management in a kid is reported here.

Materials and methods

A seven months old surti male kid was presented at the veterinary clinical complex, deesa, SDAU with the history of unilateral bulging of right upper eyelid since one month, Blepheritis and congestion of conjunctiva membrane was noticed (Fig. 1).

Clinical examination of the kid revealed all the physiological body parameter within normal range viz., rectal temperature (101.5F), heart rate (86 per minute) and respiratory rate (33per minute) and conjunctival mucus membrane was pink. The protrusion of swelling was from perorbitum (below upper eyelid) over cornea of right eye ball. Palpation revealed a soft, fluctuating, non-painful cyst. This swelling was hindrance in vision due to the protrusion but the vision was not imparted. On needle paracentesis a clear fluid was observed.

Ultra-sonographic examination was performed after restraining of kid, using a 6–8 MHz convex transducer. Usg result shows the presence of a circumscribed anechoic area due to watery consistency in the retro bulbar muscle (Fig. 2).

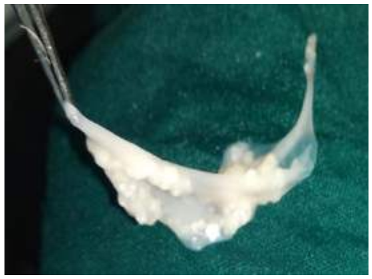
(Fig.1)

(Fig.2)

Clinical examination, ultrasonographic examination and needle paracentesis confirmed the cyst. The cyst was surgically removed by a stab incision under local infiltration of 2% lignocaine hydrochloride on mid part of swelling (Fig.3). The cyst was successfully removed intact along with its membrane. Colorless transparent fluid was drained out after removal of cyst. The cavity was flushed with normal saline. Macroscopic investigation revealed proscolices in clusters attached to the internal surface of its wall (Fig.4).

Post-surgical management carried out by Drop. Gentamicin 0.3% TID, for five days, Inj. Meloxicam @ 0.2mg/kg, IM for five days, Tab. Fentas 150mg, orally and it repeated after 21 days.

(Fig.3)



(Fig.4)

Results and discussion

The animal resumed normal vision (Fig.6).The cyst measured 2.3 cm × 2.8 cm and contained enormous quantity of fluid with many invigilated proscolices (Fig.4). Microscopic investigation of single proscolex revealed the typical taenid hooks that characteristically conforms coenurus (Fig. 5) located extra cranial found in the intermediate stage of *T. multiceps gaigeri* (Madhu*et al.*, 2014).

Clinical signs, visual examination, ultrasonography, needle paracentesis and microscopic examination of the cyst confirms the diagnosis of a Coenurus gaigeri.

Coenurosis is a mainly affecting sheep and goat which causes significant economic losses in their production. Coenurosis is associated with Taenia multiceps (metacestode stage). Gid or sturdy is the cerebral form of coenurosis. The cystic larvae develop in the brain and spinal cord of the parasitized host and affect the central nervous system Aiello and Mays 1998; Sharma and Chauhan 2006).Contrary to above, metacestode occasionally seen at aberrant sites in goats, with an alternate name (C. gaigeri), have been documented (Sharma et al. 1995;Kumar et al. 2003; Madhu et al. 2014).

The lesions often persist throughout the life span of the host (Sharma and Chauhan 2006) as a majority of coenurie affected goats shows the cysts anchor, develop, mature and cause asymptomatic focal lesions in extra cranial aberrant sites. Such animals are potentially important source of the disease in growing animals. Goats, being intermediate host usually get the infection from the dog's excreta (Ozkan et al. 2011). Entry of street dogs to goat farms should be prevented for control. Adult goats are slaughtered for human consumption that made humans dead-end intermediate hosts. The ingested eggs release oncospheres in the host intestine that penetrate the intestinal wall and migrate toward target organs through the blood stream. (Abera *et al.*, 2016).The dogs in and around the animal farms should be treated with anthelmintics for prevention. Prophylactic antihelminthic therapy can be given to the small ruminants but the economic feasibility must also be considered. Albendazole or combinations of anthelmintics (Fenbendazoleand Praziquantel) were useful in coenurosis (Ghazaei,2005).

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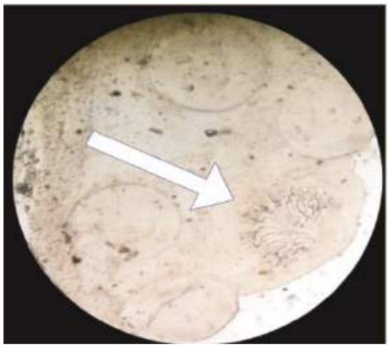

Reference

Abera S, Wubit T, Nejash A (2016) Cerebral Coenurosis in Small Ruminants: A Review. Journal of Animal Science Advances. 6(3): 1595-1608

Aher VD, Avhad C, Jadhav S, Balage PR, Lokhande DS, Mate A (2018). A rare case of peri-orbital coenurus giageri cyst in a goat and its surgical management. XLII annual congress of indian society for veterinary surgery & national symposium. 22th – 24th November, 2018; Pp-234.

Aiello SE, Mays A (1998) The Merck veterinary manual, 8th edn. Merck & Co Inc. New Jersey, pp 320–324, 338–339

Biswas D (2013). Ultrasound diagnosis and surgical treatment of coenurosis (GID) in bengal goat (Capra hircus) atchittagong metropolitan area, Chittagong, Bangladesh. Sci. J. Vet. Adv., 2(5): 68-75.

Desouky EA, Badawy AI, Refaat RA (2011). Survey on coenurosis in sheep and goats in Egypt. Vet. Italiana., 47(3): 333-340.

Gahlot TK, Purohit S (2005) Surgical management of gid (coenurosis) in goat: case report. Intas Polivet 6:297–298

Ghazaei C (2005). Evaluation of the effect of anthelminthic agents albendazole, fenbendazole and praziquantel intreatment of coenurosis disease in sheep. Journal of Animal Science Advances4(10):852-854.

Kumar N, Aithal HP, Gupta SC, Mogha IV (2003) Occurrence of unusually large coenurus cyst in subcutaneous tissues of sheep.J Vet Parasitol 17:73–74

Madhu DN, Mahan T, Sudhakar NR, Maurya PS, Banerjee PS, Sahu S, Pawde AM (2014) Coenurus gaigeri cyst in the thigh of a goatand its successful management. J Parasit Dis 38(3):286–288

Nandi SK, Pal A (2001) Successful surgical management of cyst in goat: a case report. Indian J Anim Health 40:83–84

Ozkan C, Yildirim S, Kays A (2011) Clinical coenurosis (Coenurus cerebralis) and associated pathological findings in a calf.Pakistan Vet J 31:263–266

Paliwal OP, Singh SP, Singh KP (1971) Multiceps cyst over a kidney of a goat. Indian Vet J 48:1278–1279

Raidurg R, Reddy PMT (2009) Parasitic cyst (Coenurus gaigeri) in the lower eyelid of a kid—a case report. Intas Polivet 10:302–303

Sharma DK, Chauhan PPS (2006) Coenurosis status in Afro-Asian region: a review. Small Rumin Res 64:197–202

Sharma DK, Sanil NK, Agnihorti MK, Singh N (1995) Subcutaneous coenurosis in Barbari goat. Indian Vet J 72:1203–1205

Sharma N, Kumar A, Chaturvedi V, Nayakwadi S, Mishra AK, Singh MK, Pandey RP, Srivastava A, Purohit S, Sudan V (2017) Retro-bulbar cyst of Coenurus gaigeri in Barbari goats. J Parasit Dis 41(2):367–370

Soulsby EJL. Helminths, arthropods and protozoa of domesticated animals. 7. London: Bialliere Tindall and Cassell Ltd.; 1982.

Varma TK, Malviya HC (1989) Prevalence of coenuriosis in sheep, goat and pig in Bareilly, Uttar Pradesh. J Vet Parasitol 3:69

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DNA Microarray: Gene Expression and Analysis Technology

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Abstract

The development of rapid, sensitive, high resolution and genetically significant technology for pathogen detection and typing is a necessary part of an effective disease monitoring system. Microarrays are a powerful tool among the latest molecular technologies for the high-throughput detection of many nucleic acid molecules in parallel. DNA microarrays are a relatively rapid and inexpensive way to study gene expression at the genomic scale. Expression data can be generated for thousands of genes in many different cells and tissue types exposed to a variety of stimuli. This technology is applicable in the areas of DNA, proteins, peptides and small molecules such as metabolites and drugs. Synonyms of the DNA microarrays are DNA/Gene chips, DNA/Gene arrays and Biochips.

Introduction

The most important developments in the era of revolutionized research include the completion of the human genome project and second one the development of microarray technology. DNA microarray technology is the ideal tool to study the complex genetic basis of interactions between microorganisms and the host through rapid simultaneous analysis of the thousands of genes involved with ultimately improvements in the diagnosis, treatment and prevention of infectious diseases.

Microarrays are nowadays one of the most promising tools in functional genomics. Functional genomics deals with the gene function through parallel expression measurements of a genome. The most common tools used to perform these measurements include cDNA microarrays, oligonucleotide microarrays, or serial analyzes of gene expression (SAGE).

Microarrays consist of thousands of microscopic probe spots (pieces of DNA, 20-5000 base pair range), immobilized as 2D array patterns on solid support (flat solid surfaces, microscope slides or chips made of glass, silicon, or plastic) and their use enables global patterns of gene expression to be determined in a single experiment. Each DNA spot or probe contains a picomoles concentration of a specific DNA sequence.

Microarrays evolved from Southern blotting, in which DNA fragments are attached to a substrate and then probed with a known gene sequence. The basic principle of microarrays is the hybridization between two complementary sequences of DNA strands. Microarray technology works through these important steps, with which a complete understanding of the examined cell/organism can be achieved. Microarray preparation, probe preparation followed by hybridization and finally scanning, imaging and data analysis. Microarray analysis can be divided into two main steps: probe production and target production (cDNA or cRNA). Specific sequences are immobilized on a surface and implemented with labeled cDNA targets. A signal resulting from hybridization of the labeled target with the specific immobilized probe identifies the nucleic acid sequences that are present in the unknown target sample.

Types

Glass DNA microarrays: It was the first type of DNA microarray technology developed. DNA probes are spotted on the slide by a robot through a micro-capillary and linked to the slide by covalent bonds. The advantages of this type of microarray are the low cost per array and the open architecture. Spotted microarrays allow great flexibility in the choice of array elements, especially for customized arrays for special investigations.

High-density oligonucleotide microarrays: It is often referred to as a "chip" which involves in situ oligonucleotide synthesis. The advantage of this type of microarray is more controlled hybridization specificity, which makes them particularly useful for the analysis of single nucleotide polymorphism analysis or mutation analysis. High-density oligonucleotide microarrays are designed in two types; Microspray (Agilent): DNA probes are sprayed onto the slide by inkjet printing (non-contact). In-situ arrays (Affymetrix): DNA probes are synthesized directly on the slide using photolithographic techniques.

Factors to be considered in Designing Microarray Experiments

a. Need to do lots of control experiments: validate the method (design simple experiments, *i.e.* treatment vs. control).
b. Do replicate spotting, replicate chips, and reverse labeling for custom spotted chips.

c. Conduct pilot studies before conducting "megachip" experiments.
d. Don't design an experiment without replication.
e. Understand measurement errors when designing databases.
f. Include statistical analysis in the design stages of your studies.

Protocol: The fundamental protocol for DNA microarray is as follows;

A. **Sample preparation**: A sample can be any cell/tissue in which we desire to carry out our study. In general, 2 types of samples are collected, *i.e*. healthy and infected cells to compare and get results.
B. **Isolate and purify mRNA:** Quantity and integrity of the total RNA or mRNA are important for proper results of experiments. The amount and integrity of the total RNA or mRNA are important to obtain the correct results of the experiments. RNA extraction from a sample is performed using Trizol, phenol-based methods, and RNA isolation kits.
C. **Creation of labeled cDNA:** Reverse transcription of mRNA produces cDNA. Both samples are then integrated with different fluorescent dyes to produce fluorescent cDNA strands, allowing the sample category to be differentiated from the cDNAs. Two DNA samples, typically a "test" and a "control", are fluorescently labeled differently with fluorochrome dyes, usually Cy5 (red) and Cy3 (green).
D. **Hybridization:** The labeled cDNAs from both samples are placed on the DNA microarray, allowing each cDNA to hybridize to its complementary strand. They are then washed thoroughly to remove unpaired sequences. The most important influencing factors are temperature, pH value and the presence of organic solvents.
E. **Scan the microarray:** A microarray scanner is used to collect the data. The fluorescent tags of the bound cDNA are excited with a laser and the fluorescently labeled target sequences that bind to a probe generate a signal. Each image consists of an array of pixels, and each pixel represents the fluorescence intensity of a small area of the array. The overall strength of the signal depends on the amount of target sample that binds to the probes present at that point. The signals are captured, quantized and used to create a digital image of the matrix.
F. **Analysis and Normalization:** The raw data from a microarray after the scanning process consist of pairs of image files (one for each dye). Automatic analysis systems are used for the extraction of the red and green intensities for each spot on the array. First, the location

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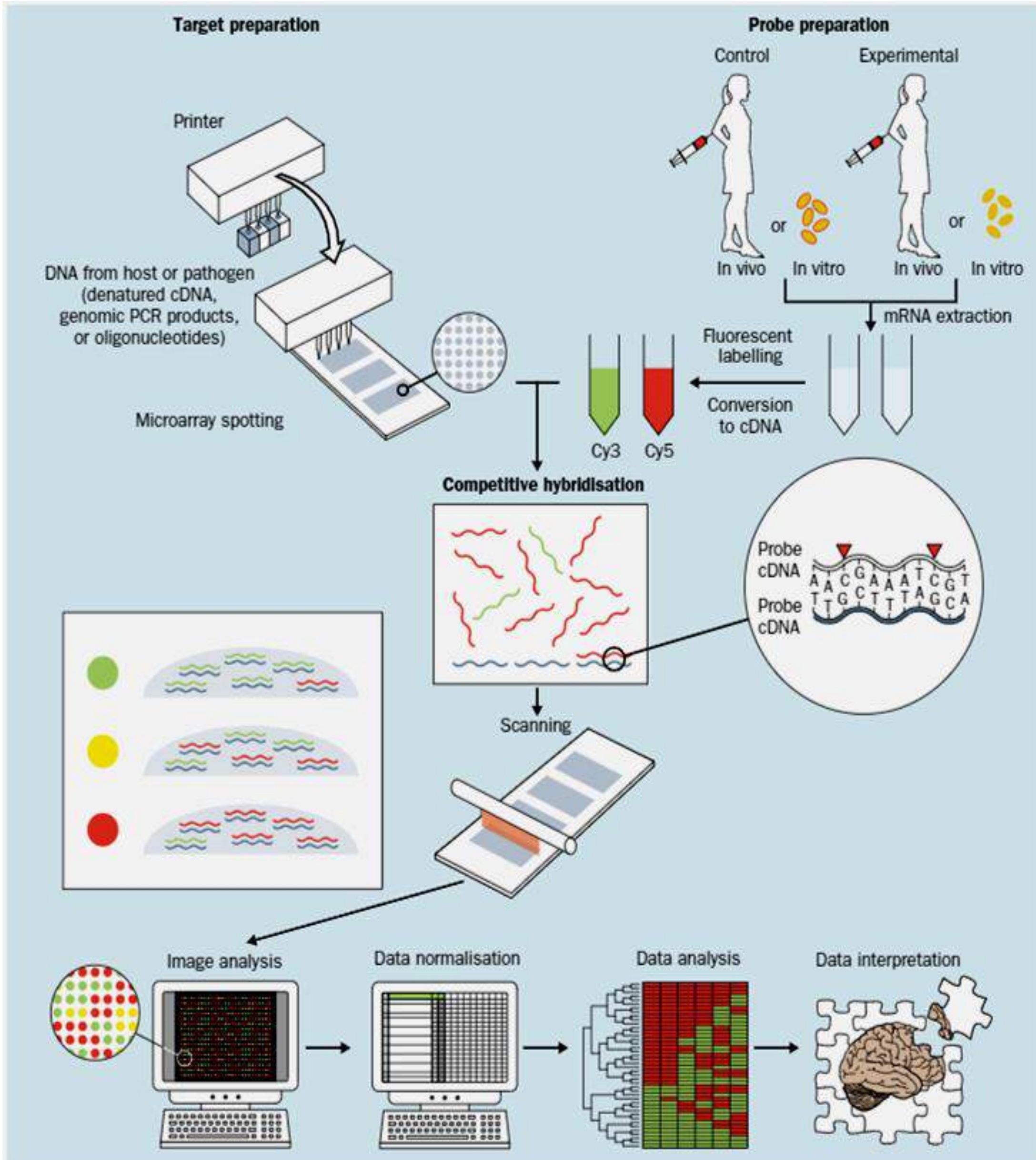

Figure: Overview of the steps involved in DNA microarray experiments (Source: Bryant *et al*., 2004).

of the spot, centers must be detected. The spots usually vary in size and shape. Therefore, segmentation is required to determine which pixel on the array image belongs to the spot (foreground) or to the background. Calculate the relationship between the backgrounds corrected intensity for the Cy5 image and that of the Cy3 image for each point.

Ratio Calculation: $M = \log 2\ R/G = \log 2R - \log 2G$

M < 0	**The gene is over expressed in a green-labeled sample compared to a red-labeled sample.**
M = 0	The gene is expressed identically in both samples.
M > 0	The gene is over expressed in a red-labeled sample compared to a green-labeled sample.

The ratios are normalized to exclude any bias towards one of the two probes. The normalization is based on the assumption that only a small fraction of the genes among the thousands of genes present in the array are expressed differently and/or that there is a symmetry in the positive and negative regulation of the genes. The normalized data can then be classified to identify changes in expression between the reference and test conditions. Normalization should be used to correct for color imbalance. Normalization is used in different ways: normalization within slides and normalization between slides.

Conclusion

DNA microarray technology allows the analysis of the function of genes and their products at a molecular level. New applications are being pursued beyond gene expression, gene discovery, genetic research and pharmacogenomics and are now gaining prime importance in the areas of medical diagnostics, particularly for applications in cancer, inherited and infectious diseases. Microarray has shown great potential in veterinary diagnostics. The microarray technique has been used successfully to detect pathogens that are associated with the disease outbreak. The main objective of the tool is to detect the presence of a pathogen before the disease outbreaks. However, the development and use of species-specific primers are not practical for the routine analysis of clinical samples containing multiple pathogens. The technology, which currently has limited applications due to cost, may broaden its prospects as the availability of commercial products increases.

References

Bajcsy, P. (2006). An overview of DNA microarray grid alignment and foreground separation approaches. *EURASIP Journal on Advances in Signal Processing*, *2006*, 1-13.

Bajcsy, P., Liu, L. and Band, M. (2007). DNA microarray image processing. *DNA Array Image Anal. Nuts Bolts (Nuts Bolts Ser.*, 1-77.

Bryant, P. A., Venter, D., Robins-Browne, R. and Curtis, N. (2004). Chips with everything: DNA microarrays in infectious diseases. *The Lancet infectious diseases*, *4*(2), 100-111.

Bumgarner R. (2013). Overview of DNA microarrays: types, applications, and their future. *Current protocols in molecular biology*, *Chapter 22*, Unit–22.1.

Govindarajan, R., Duraiyan, J., Kaliyappan, K. andPalanisamy, M. (2012). Microarray and its applications. *Journal of pharmacy &bioallied sciences*, *4*(Suppl 2), S310.

Lockhart, D. J., Dong, H., Byrne, M. C., Follettie, M. T., Gallo, M. V., Chee, M. S. and Brown, E. L. (1996). Expression monitoring by hybridization to high-density oligonucleotide arrays. *Nature biotechnology*, *14*(13), 1675-1680.

Schena, M., Shalon, D., Heller, R., Chai, A., Brown, P. O. and Davis, R. W. (1996). Parallel human genome analysis: microarray-based expression monitoring of 1000 genes. *Proceedings of the National Academy of Sciences*, *93*(20), 10614-10619.

Wang, D. G., Fan, J. B., Siao, C. J., Berno, A., Young, P., Sapolsky, R. and Lander, E. S. (1998). Large-scale identification, mapping, and genotyping of single-nucleotide polymorphisms in the human genome. *Science*, *280*(5366), 1077-1082.

Wiltgen, M. and Tilz, G. P. (2007). DNA microarray analysis: principles and clinical impact. *Hematology*, *12*(4), 271-287.

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Role of Veterinarians in One Health Approach

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Abstract

One Health is an idea that recognises that human and animal health, as well as the environment in which we all exist, are intrinsically intertwined. Human health, animal health, the environment, and other sectors require professionals to communicate, collaborate, and coordinate their efforts. The veterinary profession contributes to the improvement of human and public health by improving agriculture and food systems, advancing biomedical and comparative medical research, preventing, and treating zoonotic diseases, enhancing environmental and ecosystem health, and assisting in the management of 21st century public health challenges. Lessons learned from SARS, monkeypox, West Nile virus, and avian influenza stress the importance of approaching diseases holistically, integrating animal and public health surveillance, epidemiology, and laboratory systems, and forging new strategic partnerships among animal, human, and public health professionals. Veterinarians play a key role in bioterrorism threat assessment, diagnosis, and response, as well as first-line defence and monitoring.

Introduction

One Health is the view that humans, animals, and the environment in which we live are all intricately related. Second, it refers to a multidisciplinary effort to attain optimal health for people, animals, and the environment at the local, national, and global levels. It's a once-in-a-lifetime chance for veterinarians to take the lead and work for the greater good of society's ecosystem health. Veterinarians play a significant role in One Health (Islam, 2014), which evolved from Calvin Schwabe's One Medicine concept, which proposed for a combined medical and veterinary approach for preventing and controlling zoonotic disease that is naturally transmitted between animals and humans in his book "Veterinary Medicine and Human Health" published in 1984. Veterinarians contribute to human health by promoting animal health, which generates critical revenue, food, transportation, draught power, and clothing raw materials throughout the world. Promoting animal health improves the quality and quantity of animal products. Animal-derived meals can help malnourished people improve their nutritional status by delivering high-quality protein and minerals, which is especially important in developing countries. At the national and regional levels, improved animal health and product testing of animal-derived commodities contribute to food security in all countries.

Most veterinarians, whether directly or indirectly, contribute to public health goals and outcomes. Veterinarians' contributions to public health can be classified into numerous categories, as shown below.

Zoonotic Disease

The rise of zoonotic illnesses has stemmed from the rapid growth of the human population and its migration into new locations. In the last ten years, microorganisms originating from animals, or their products have caused 70% of new infectious disorders. According to research, zoonotic pathogens are responsible for 64% of known human pathogens and 73% of developing human diseases (OIE, 2007). Veterinarians and veterinary services are on the front lines when it comes to recognising, diagnosing, and responding to these diseases. Most private veterinary practitioners contribute to public health in their everyday practise (Kahn, 2007). Large and small animal practitioners who become experienced diagnosticians diagnose acute and chronic animal illnesses that may affect owners and their families, as well as the surrounding community. The communities gain the most from veterinarians who approach collective health issues from a "herd health" perspective and apply relevant epidemiologic approaches. Veterinarians diagnose, research, and control indirect zoonoses and non-zoonotic infectious diseases that represent a risk to human health in addition to dealing with direct zoonotic diseases in animals. Some of the diseases that wreak havoc on the food supply, the economy, and the livelihoods of the country's farmers include West Nile disease and coccidioidomycosis in pets, as well as bovine leukosis, foot and mouth disease, chicken pox, and several others (Knobler, 2004).

Food Safety

Traditionally, veterinarians' responsibilities expanded beyond the farm to the slaughter house, where they oversaw both epidemiological surveillance of animal diseases and ensuring the safety and acceptability of meat. Through their presence on farms and appropriate collaboration with farmers, veterinary services play an integral role in making sure that animals are kept in sanitary conditions and in the early diagnosis, surveillance, and treatment of animal diseases, including conditions of public health significance. Slaughterhouse inspection of live animals (antemortem) and carcasses (post-mortem) is essential for animal disease and zoonoses surveillance, as well as ensuring the safety and acceptability of meat and by-products for their intended uses. Through ante- and post-mortem meat inspection, the Veterinary Services have a fundamental role in controlling and/or reducing biological risks of animal and public health importance (Attrey, 2017). The Veterinary Services also play a vital role in providing health certification to outside trading partners, ensuring that exported products meet animal and food safety regulations. The zoonotic agent causes most foodborne disease outbreaks by contaminating foods, which happens frequently during primary production. Veterinary Services is crucial in tracing epidemics back to the farm, as well as devising and implementing remedial measures after the outbreak's source has been identified. Veterinarians are well-equipped to ensure food safety in other parts of the food supply chain, such as during food processing and distribution, employing HACCP-based controls and other quality assurance methods. The Veterinary Services come in to educate food producers, processors, and other stakeholders on the steps that must be taken to preserve food safety.

Wildlife

The veterinary and wildlife professions might work together strategically in One Health to help the public better understand the "whys" and "hows" of zoonotic disease outbreaks, and even the positive attributes of a healthy ecosystem and wildlife. In today's highly competitive media industry, uniting the efforts of many different health professions through an interdisciplinary One Health plan could result in significantly better media coverage. It's crucial to discover out how disease-causing compounds in wildlife end up in people. Recognize the impact they have on the animals that act as main and intermediate hosts. Vets are in a privileged position to diagnose, track, and mitigate disease outbreaks because of their expertise and experience with zoonotic diseases (Buttke, 2015).

Disaster Preparedness

Animals, like humans, are affected by natural and man-made disasters and emergencies, both great and little. Veterinarians play an essential role in disaster response and recovery, whether it's a hurricane or tornado, a flood or an earthquake, a chemical leak, or a terrorist attack. They are vital in promoting and helping disaster preparedness to minimise the impact of crises on both animals and people. Veterinarians are in a unique position to improve the country's monitoring and disaster response systems because of their ideal social position, easy access to animal owners, and knowledge and training.

Antimicrobial resistance (AMR)

The ability of microorganisms to tolerate the effects of antimicrobial treatments is referred to as antimicrobial resistance. In other words, the antimicrobial drug either does not kill or inhibits the growth of the bacteria. One technique for reducing the risk of AMR transmission from animals to humans is to reduce zoonotic bacterial transmission. This can be accomplished by maintaining strict hygiene in farms as well as any meat processing facilities, such as abattoirs and markets. Heating animal foods thoroughly and properly, reduces the risk of AMR. In the discovery and application of antibiotics, veterinarians are at the lead of proper use and extensive control methods (WHO, 2002).

> ***Without veterinarians, humans and animals would face famine, sickness, and death; environmental pollution would rise; economic growth would stagnate and due to a lack of sustainable agri-food production and trade, food diversity would be lost.***

Conclusions

Maintaining natural barriers between reservoir animals and human civilization while infusing the One Health ideology into these activities may be the most successful strategy (de Melo, 2020). In the case of new and re-emerging zoonoses, the veterinarian must take the lead in research and measures that primarily focus on prevention and surveillance, which are key components of maintaining public health.

References

Attrey, D. P. (2017). Role of veterinary experts in food safety. In *Food safety in the 21st century* (pp. 297-310). Academic Press.

Buttke, D. E., Decker, D. J., & Wild, M. A. (2015). The role of one health in wildlife conservation: a challenge and opportunity. *Journal of Wildlife Diseases*, *51*(1), 1-8.

de Melo, R. T., Rossi, D. A., Monteiro, G. P., & Fernandez, H. (2020). Veterinarians and One Health in the Fight Against Zoonoses Such as COVID-19. *Frontiers in Veterinary Science*, *7*, 756.

Islam, M. A., (2014). Zoonoses in Bangladesh: the role of veterinarian in public health. *Bangladesh Journal of Veterinary Medicine*, *12*(2), 93-98.

Kahn, L. H., Kaplan, B., & Steele, J. H. (2007). Confronting zoonoses through closer collaboration between medicine and veterinary medicine (as 'one medicine'). *Veterinaria Italiana*, *43*(1), 5-19.

Knobler, S., Mahmoud, A., Lemon, S., Mack, A., Sivitz, L., & Oberholtzer, K. (2004). Workshop Summary. *Learning from SARS: Preparing for the Next Disease Outbreak.*, *11*.

Oie (World Organisation for Animal Health) (2007): Terrestrial Animal Health Code, 2007 Edition. OIE, Paris, France

WHO. Future trends in veterinary public health. Technical report. 2002; 907:12-18.

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Effect of vaccination on animal production

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Abstract

Vaccination in cattle results in acute phase response which results in inflammatory reaction and includes production of pro-inflammatory cytokines, acute phase protein (APP), release of prostaglandins in the brain, which may induces the febrile reaction in body, due to all these inflammatory reactions animal shows some physiological responses like lethargy, anorexia, rise in body temperature, and decreased milk production. The possible reason of decrease in production performance and fertility following vaccination is hyperthermia and stress,

Introduction

Dairying is one of the primary livelihoods for most of landless or marginal farmers. India becomes the top milk producer, with 198.4 million tones contributing about 23% of world milk production, which is growing at around 1.8%, out of which India contributes 1% share. Milk production is considered India's largest agricultural commodity, whose value accounts for Rs 6.5 lakh crore, which is much more than paddy and wheat put together. In order to increase the production efficiency of dairy animals, an efficient and effective disease prevention and control policy are of vital importance. However, vaccination in the Indian dairy industry is considered an emerging innovation of socio-economic significance. The vaccine acceptance and dissemination rate at the field level is very low (Rathod *et al.*, 2016). The possible reason of decrease in production performance and fertility following vaccination is hyperthermia and stress. Systemic reactions following vaccination can result in hypoglycemia, pyrexia, depression, and decreased cardiac output (Roth, 1999).

Stress-induced due to vaccination

Vaccination stress stimulates the hypothalamic-pituitary-adrenal axis, which may induce two types of stress i.e., acute stress (<24 hours) and chronic stress (few days to several weeks). Exposure to vaccine antigen in cattle results in an acute phase response which results in inflammatory reaction and includes production of pro-inflammatory cytokinins, acute phase protein (APP), increase in WBC (leucocyte), release of prostaglandins in the brain, which may induces the febrile reaction in body, due to all these inflammatory reactions animal shows some physiological responses like lethargy, anorexia, decreased social and sexual behaviors, and decreased milk production. Schulze *et al*. (2016) reported a significant increase in body temperature after phase I *Coxiella burnetii* inactivated vaccination (1.0 ± 0.9 °C) and observed an increase in temperature peaks in the first 12 to 24 hours then decline to normal. Blue tongue vaccine caused a rise in temperature from 39.4 ° C to 39.8 °C over one to three days (Giovannini *et al*., 2004). Ferreira *et al*. (2016) studied the effect of FMD vaccination on rectal temperature, and they found that greater ($P < 0.01$) temperature were found in the vaccinated group as compared with non-vaccinated at 24 h after vaccine administration. Scott *et al*. (2001) studied the effects of 2 commercially-available 9-way killed vaccines showed that treatment and sentry groups exhibited average temperatures 0.41 °C and 0.29 °C higher, respectively, than that of the control group.

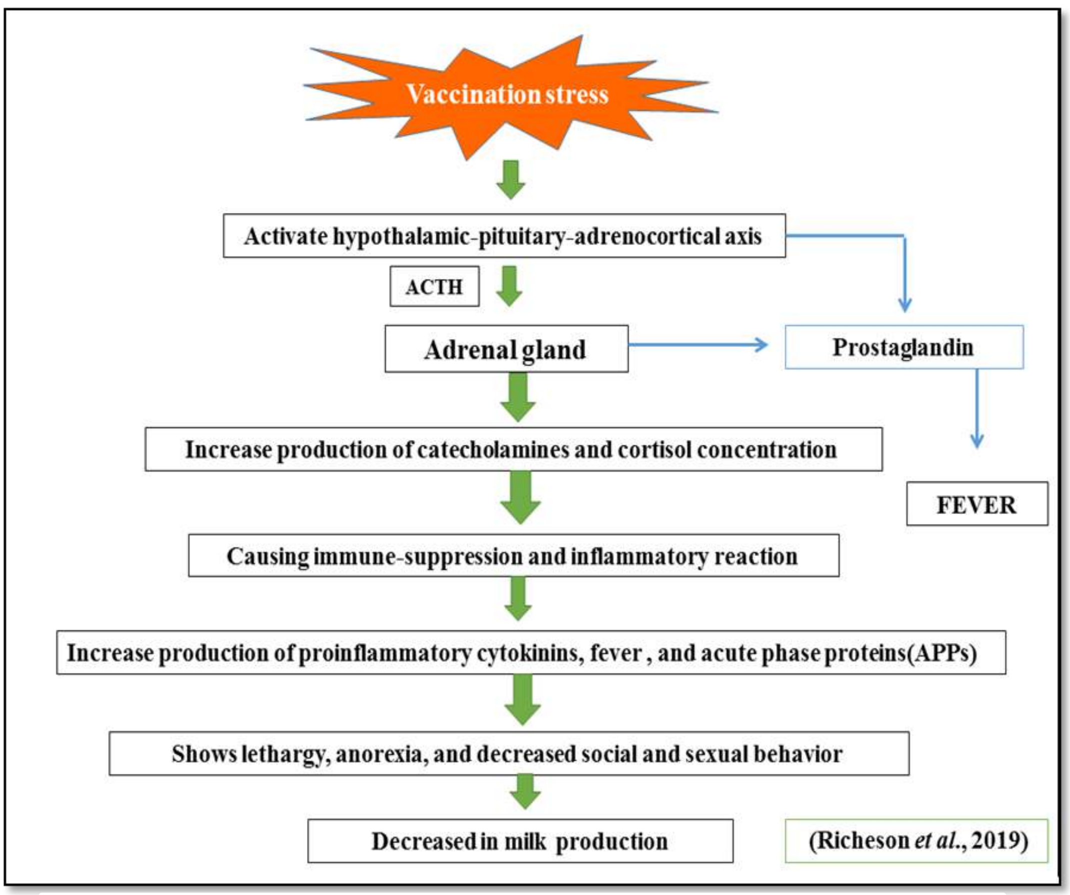

Fig. 1 vaccination stress

Effect of vaccination on milk production

It is well documented that vaccination is associated with stress in animals, and dairy farmers experienced transient losses in milk production in lactating milk cows after vaccination (Bergeron *et al.,* 2008), but less reported literature on transient milk production loss after vaccination is available under the Indian scenario (Krishnaswamy *et al.,* 2021). In a study, vaccines containing up to 4 killed viruses in combination with a 5-way leptospiral bacterin are often used to vaccinate dairy cattle in North America, having viral components, i.e., bovine herpesvirus1 (BVH-1), bovine respiratory syncytial virus (BRSV), bovine viral diarrhea virus (BVDV) and parainfluenza-3 virus (PI-3V) and observed the effect of vaccination on milk production and rectal temperature. Significant ($P < 0.01$) correlations between treatment and time were found when comparing vaccine and placebo-treated animals, and significant ($P < 0.05$) depression in milk production (-2.53 kg/d) was observed one day after injection (Scoot *et al.*, 2001).

Several studies are reflecting a decrease in milk production after vaccination. Bergeron *et al.* (2008) reported significant decrease in milk yield after C and T vaccine (Cattlemaster Gold FP5; Pfizer) (C vaccine: -1.83 kg/cow/day; Triangle 4 + Type 2 BVD; -0.63 kg/cow/day vs. saline, -0.02 kg/cow/day) in dairy animals. Musser *et al.* (1996) reported a decrease in 1.4 to 5.3 kg of milk per cow after *Escherichia coli* bacterin-toxoid vaccination in 4 days after vaccination. Schulze *et al.* (2016) recorded a decrease in milk production in vaccinated cows (26.8 ± 0.39 kg/d) as compared to non-vaccinated cows (28.2 ± 0.44 kg/d) in the case of phase I inactivated *Coxiella burnetii* vaccine.

In a study on the effect of inactivated bovine herpes virus 1 vaccination on milk yield was assessed based on the procedure consists of two injections of vaccine or placebo, each separated by four weeks. There was a slight but substantial ($P < 0.05$) decline in milk output by around 1.4 kg per cow (Bosch *et al.*, 1997). Scott *et al.* (2001) examined the impact on milk production of 2 commercially available 9-way vaccines (triangle and sentry) and reported that the cows averaged 29.10 kg/d in the Control group, 28.20 kg/d in the Sentry group, and 28.14 kg/d in the Triangle group over the entire 21-day study period. The mean daily milk yields of vaccinated (Sentry, Triangle) Holstein-Friesian cows are lower as compared to placebo-treated (Control) classes.

Abutarbush *et al*. (2016) examined the impact of the LSD (lumpy skin disease) vaccine on milk production and observed a 5.5-16% loss in milk production. Bergeron *et al*. (2008) used Vaccine C (cattle master gold FP 5) and Vaccine T (triangle 4 + type 2 BVD) in cows and observed milk production loss of 1.83kg/cow/day and -0.63kg/cow/day, respectively after vaccination. Krishnaswamy *et al*. (2021) studied the short-term effect of foot-and-mouth disease (FMD) vaccination on the milk yield in the Deoni and Crossbred cows. They found that day 1 following vaccination, the Deoni cow had a marginal drop of 90 g in corrected milk yield, but the Crossbred cow had a 360 g fall on day 0 (vaccination day) compared to day -1 (before vaccination). FMD vaccination resulted in a non-significant drop in milk output in Deoni and Crossbred cows for a small period.

Conclusion

It has been concluded that vaccination may cause transient stress and drop in milk production in animals following vaccination so, ameliorative Strategies can be formulated to minimize the vaccination stress in dairy animals by using of ideal adjuvant, DNA vaccines and immuno-modulators.

References

Abutarbush, S. M., Hananeh, W. M., Ramadan, W., Al Sheyab, O. M., Alnajjar, A. R., Al Zoubi, I. G. and Tuppurainen, E. S. M. 2016. Adverse reactions to field vaccination against lumpy skin disease in Jordan. *Transboundary and Emerging Diseases*, **63**(2):213-219.

Bergeron, R. and Elsener, J. 2008. Comparison of postvaccinal milk drop in dairy cattle vaccinated with one of two different commercial vaccines. *Veterinary Therapeutics: Research in Applied Veterinary Medicine*, **9**(2):141-146.

Bosch, J. C., Frankena, K. and Van Oirschot, J. T. 1997. Effect on milk production of vaccination with a bovine herpesvirus 1 gene-deleted vaccine. *Veterinary Record*, **140**(8):196-199.

Ferreira, L. C. L., Cooke, R. F., Marques, R. S., Fernandes, H. J., Fernandes, C. E., Stelato, R. and Lemos, R. A. A. 2016. Effects of vaccination against foot-and-mouth disease virus on reproductive performance of Bos indicus beef cows. *Journal of Animal Science*, **94**(1):401-405.

Krishnaswamy, N., Jeyakumar, S., Selvan, R. T., Gowane, G. R., Mahadappa, P., Vijayapillai, U. and Sanyal, A. 2021. Short-term effect of foot-and-mouth disease (FMD) vaccination on the milk yield in the Deoni and crossbred cows. *Tropical Animal Health and Production*, **53**(2):1-6.

Musser, J. M. and Anderson, K. L. 1996. Effect of vaccination with an Escherichia coli bacterin-toxoid on milk production in dairy cattle. *Journal of the American Veterinary Medical Association*, **209**(7):1291-1293.

Rathod, P., Chander, M. and Bangar, Y. 2016. Livestock vaccination in India: an analysis of theory and practice among multiple stakeholders. *Rev Sci Tech Off Int Epiz*, **35**(3):729-739.

Roth, J. A. 1999. Mechanistic bases for adverse vaccine reactions and vaccine failures. *Advances in Veterinary Medicine*, **41**:681.

Schulze, L. C., Borchardt, S., Ouellet, V. and Heuwieser, W. 2016. Effect of a phase I Coxiella burnetii inactivated vaccine on body temperature and milk yield in dairy cows. *Journal of Dairy Science*, **99**(1):541-550.

Scott, H. M., Atkins, G., Willows, B. and McGregor, R. 2001. Effects of 2 commercially-available 9-way killed vaccines on milk production and rectal temperature in Holstein-Friesian dairy cows. *The Canadian Veterinary Journal*, **42**(10):793.

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Management of Eri Silkworm Diseases in Indoors Site

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Introduction

The *Samia Cynthia richni* eri silkworm are caused by protozoan, Bacterial, and viral diseases. For those diseases prevalence due improper management practices and exhausted diseases infect leaves feeding on during the period. Above the constraints minimized in during the period to provide health leaves and maintain in rearing hall during the eri silkworm.

1. Protozoan

The pebrine diseases of Protozoan caused by *Nosema s.* The *Nosema s.* spore from mulberry silkworm is no infection to eri silkworm and vice versa. The pebrine spores estimated from 3.2 to 4.6 microns in length and width ranges from 1.5 to 2.1 microns. The diseases are persistent in improper management in rearing house. The pebrine diseases caused by all the stages of silkworm such as egg, larva, pupa and adult.

Nature of Symptoms

- Pebrine disease caused eri silkworm is the main characteristic distinct.
- Irregular moulting in rearing trays it is an initial symptoms noticed.
- Sluggish nature of infected worms
- Reduced feeding
- Affected worm are body become very soft and darker appears.
- Uneven size of the silkworm in the rearing beds
- Stunted growth and black pepper like spots are phenomenon over the body region of larva.
- Moth emergence is succumbed and incase the emerged eri silkworm moths are with small, malformed and developed on irregular shaped of wings.
- Moths laying eggs are unfertilized eggs
- Reduced fecundity
- The eggs laid by infected moths do not hatch.

2. Muscardine Causal Organism

Fungal diseases of eri silkworm caused by *Botrytis bassiana*

It is prevalence during rain and winter season due low temperature and high humidity. The main reason occurs in fungal diseases over damping, shady place and foggy conditions, improper bed cleaning above same leads to the occurrence of the fungal diseases.

Symptoms

- The fungal diseases infected silkworm otherwise called as muscardine.
- Hyphae are entry in integument to affecting the entire region. The fungal spore nourished and developed in inside body, severe infestation entre body covered with mycelium mat. Affect larva are following symptoms are noticed
- The infected larva becomes sluggish
- Body is swollen
- Irregular moulting
- Entire body is covered with fungal spores and gets mummified at later stages seen green or white colour.
- Affected worms limp, looses elasticity, cease to move and die rapidly.

Control Measures

- Avoid dampness in rearing house and rearing bed.
- Maintain hygienic in rearing hall avoid further infestation of diseases.
- Maintain the humidity and temperature in rearing hall.
- Avoid feeding tender leaves to late age worms.
- Infected worms collect frequently in everyday avoid further infestation.
- Surface sterilization of formalin 2 per cent or bleaching powder 3 per cent in rearing house.

3. Flacherie- Bacterial disease

- Bacterial disease affected eri silkworm larva is called flacherie.
- It is a persistently caused in eri silkworm larva particularly all the season except winter and rainy season.
- Loss is estimated around upto 30 per cent.
- There huge factors accountable for the diseases occurrence
- Harsh climatic condition, poor ventilation, poor sanitation, stagnating of fecal in rearing trays and providing feeding on unhygienic leaves are the predisposing factors.

Symptoms

The bacterial diseases affected eri silkworm caterpillars certain symptoms are seen

- Loss of appetite, lethargic movement, and body and thorax region appear swollen, unequal size worm in rearing trays, decrease in size of abdominal segments.

- Looses of clasping power and severe infestation leads to start vomiting.
- Soft and sticky excreta are also observed.
- Body blackens and rots at later stage.
- The disease generally occurs in late age worms.

Damage

- Loss due to this disease accounts for 14-30 per cent.

Control Measures

Apply of bleaching powder and slacked lime mixture at 1:9 rations on the rearing shed and beds before raising crops as well on the floor @100 g/ sq m area with proper disinfection of rearing room and appliances.

4. Viral diseases of eri silkworm

- It is a serious diseases of all the types of silkworm
- Severe an infestation in all the season except in rainy and winter seasons.
- Eri silkworm is affected by both NPV and CPV.
- It is susceptible to eri silkworm but has been is reported in Eri silkworm.

Occurrence

- Occurs during summer seasons when there is excess of moisture in leaves. Factors responsible for occurrence of disease
- Fluctuation in temperature and humidity, feeding of tender and contaminated leaves, improper bed cleaning and poor ventilation are the predisposing factors.

Symptoms

- Certain symptoms noticed affected in eri silkworm caterpillar to characters is seen
- Irregular moulting
- Unequal size of worms
- Restlessness swelling
- Affected worms is become a shiny appearance and otherwise called as tree top diseases. This is the expression of hanging symptoms. The affected worms roaming in trays and hang upside down.
- Severe infestation on worms the following symptoms are accountable
- Skin fragile and oozing out of white fluid

Cytoplasmic polyhedrosis virus symptoms of disease

- Vomiting and diarhoea
- Reduce feeding, sluggishness of worms
- Rectal protrusion is the characteristic is CPV
- Milky appearance of mid gut

Control Measures

- Apply of bleaching powder and slacked lime mixture at 1:9 rations on the rearing shed and beds before raising crops as well on the floor @100 g/ sq m area with proper disinfection of rearing room and appliances.
- Rearing of eri worms under proper sanitation and hygiene.
- Avoid overcrowding of worms in rearing bed.
- Avoid feeding tender leaves during late age.
- Clean the rearing bed every day during fourth and fifth stages.

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Introduction to Mulberry Non- Mulberry Silkworms in India

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Introduction

India is a unique position all the four types of silk production due huge quantity of host plant prevalence in forest area. Mulberry silkworms are cultivated in five traditional states such as Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal and Jammu Kashmir. Apart from that non-mulberry silks as eri, tasar and muga worms. The non-mulberry silkworms otherwise called as Vanya silk.

A. Mulberry silk

India is second largest raw silk production next first in china. Majority of the commercial silk produced in the world from this variety and often refers to mulberry silk. Mulberry silkworm originated from foot hills of Himalayan region. Bombyx mori which mainly feeds on the leaves of mulberry plant. These silkworms are highly domesticated and reared indoors site. The mulberry sector continues to be predominantly rural and small farmer based with post cocoon activites in the cottages and small industry sector. Mulberry silk contributes to around 80 percent of the silk production. Mulberry silk accounted 80 per cent of silk production and remaining of silk production 20 per cent of non- mulberry.

B. Tasar

Tropical tasar growing area froms a unique belt of humid and dense forest sprawling over the central and southern plateau, covering the traditional states of Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa and touching the fringes of west Bengal, Andhra Pradesh, Uttar Pradesh and Maharashtra.

Tropical silkworm is domesticated and host plant are vast available in forest areas names as Arujan, Asan Ber, ect.

Temperate silkworm originated from foot hills of indo-Himalayan regions and touching states also but mainly home place of Himalayan. Temperate tasar silkworm growing area of Jammu Kashmir, Manipur, Himachal Pradesh, Uttarkhand only hills site, Assam, Mizoram, Arunachal Pradesh and Nagaland.

Tasar silkworm is first two instar reared on indoor site and remaining instar carryout on outdoor condition. Produced cocoon is become a brown colour, but silk is copper-ish beige color use has its own feel and appeal. Tasar culture is the main stay for many tribal communities in India.

C. Oak Tasar

Oat or temperate tasar silkworm the host plant is oat tree *(Quercus*). In India those silkworm worms are reared indoor conditions. The host plant found in exhausted in the sub-

Himalayan site of India spreading the states of Jammu Kashmir, Uttarkhand, Assam, Mizoram, Himachal Pradesh and Manipur. China is the maximum producer of oak tasar in the world followed by India is second place.

D. Eri

In India, eri silkworms is first examined in Brahmaputra site of Assam in the tribal living districts, followed by Meghalaya, Nagaland, Mizoram, Manipur and Arunachal Pradesh. Eri culture is recently has practiced in the states of Andhra Pradesh, Tamil Nadu, West Bengal ect. It is semi-domesticated and produced cocoon has discontinues. Eri silkworm is multivoltine characters to rearing on all season in India. 90 per cent silk produced in northern east region and remain 10 per cent of south and northern region. The silk nature is spun nature due moth come out from cocoon after made of silk.

Eri silkworms' being polyphagous types has wide range of food plants such as Cassava, Papaya, Payam, Kessaru and Berkessuru etc. But primary host of castor leaves in eri silkworm due exhausted moisture content in leaves and high palatable to worm.

Eri culture is a household practiced mainly in Assam site for protein rich pupae, a taste for the tribals in the regions. The tribals made of silk and chaddars is traditional without other instrument. Eri silk fabric is a boon for those who practice absolute non-violence and do not use any productobtained by killing any living creature. Eri silk now popularized as Ahinsa silk. Now eri silk is getting popular the world over due to the isothermal properties which make it suitable for shawls, jackets and blankets.

Eri silk now popularized as “Ahinsa Silk”. Now Eri silk is getting popular the world over dueto the isothermal properties which make it suitable for shawls, jackets and blankets. Eri culture is confined mainly in the North-Eastern States. It is also getting popularized in Bihar, West Bengal, Odisa, Uttar Pradesh and Andhra Pradesh. Eri silk is suitable for knit products, under wears, kids wear, denim and other fashion garments.

E. Muga

- Muga silk is sole in India due to silk is highly superior quality. Muga silkworm is confined in Brahmaputra site of Assam. Now, 95 per cent of the muga silk production in Assam and remain 5 per cent of silk produced on neighboring states of Meghalaya, Nagaland, Manipur, Mizoram, Arunachal Pradesh and West Bengal.
- It is produced cocoon become golden yellow colour cocoon and silk is unique in India. Muga silkworm is multivoltine nature, Antheraea *assamensis* are reared all the season and the first two instar reared in indoor and remain instar reared in outdoor site. The silkworm feed on the aromatic leaves of som and soalu plants.
- This golden yellow colour silk is prerogative of India and the pride of Assam State. It isobtained from the wild multivoltine silkworm, *Antheraea assamensis*. These silkworms feed on thearomatic leaves of Som and Soalu plants and are reared outdoor on trees similar to that of tasar. It produced silk is one of the world treasures of fine silk fabrics made of hand operated looms.

- The natural shimmery golden colour of thisrare, wild silk needs no dye to enhance its exquisite beauty.

- It is a high value product used in products like sarees, mekhalas, chaddars, etc. Muga culture isspecific to the State of Assam andan integral part of the tradition and culture of that State. However,the muga culture is getting popularized to other States like West Bengal, Meghalaya and Nagalanddue to the availability of Som and Soalu plants. Muga is now used to replace zariin sarees and forsurface ornamentation is garments / apparels, etc.

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Strategies to Control Human - Elephant Dispute

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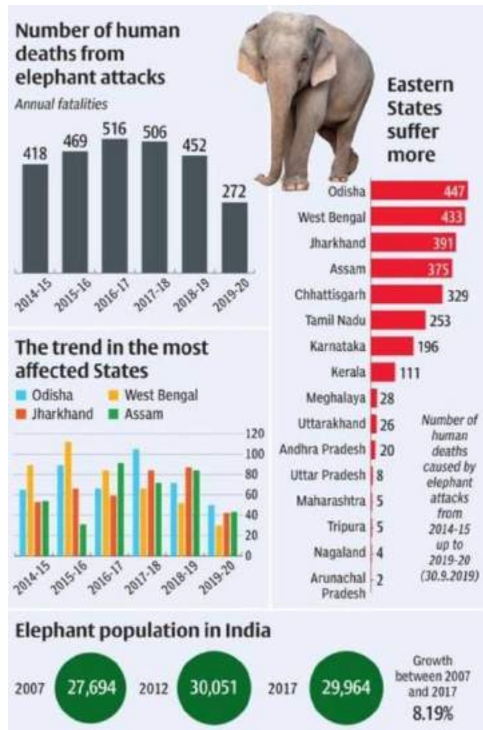
Introduction

Conflict of human and elephant is a multiplex interplay between human and elephants and represents the exceedingly harmful (mutualism). In Asian elephant population India stands first position, among 60% in global population. In wild Asian elephant population Karnataka stands first in India. Mean compensation amount paid for human animal conflict per year was 3, 11, and 08,131 of which elephant's accounts for 13% of compensation amount. Annually there are More than 300 humans are killed in encounters with elephants and 40 - 50 elephants are killed by humans.



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Reasons for Human Elephant Dispute

The major conflict between elephant and human results habitat loss and fragmentation. The interaction causes crop raiding, and deaths to humans by elephants, and elephants being killed by humans for reasons are habitat degradation and ivory. Human settlement, loss of habitations and deforestation are the main reasons for human elephant conflict.

Crop raiding and Destruction

The prime habitat of most of the elephants where near the farm land. These are often more prone to crop riding and their property damage. The majority of the farmland are created by destroying the prime habitats of the elephants. Sadly the farmers where greatly suffered, because of the herd of elephant where destroying their livelihood in a single night. When farmers plant crops that elephants like to eat such as sugarcane, maize, and vegetables may cause the situation like exacerbated.

Slashes and deaths to humans

Recently the habitat of elephant where encroached by humans due to their grown population. The elephant migratory path or part of elephant home range areas where declined due to human settling in that area. Over population in elephant range countries, there is high demands for space and water. Once up on a time where the elephant habitats are occupied, now it was replaced by construction of railway lines, dams and roads. The elephants are migratory animals, herd lead by the matriarchs through ancient migratory routes for the source of food and water. During this process the ancient route was occupied by the human this results devastating.

Recrimination

Recrimination of elephant commonly quite increasing nowadays. When crop riding occur people where viewed as danger and risk their livelihood. Hundreds of elephants where killed in a year by poisoning and shooting, through retaliation by humans. Electrocution is another issued and/or there are using as an a weapon.

Poaching for ivory

Nearly 60 percentage of male elephants where killed for ivory. Compare to Asian elephant African elephant where highly pouched for ivory. In traditional ancient medicine there is a demand of elephant body parts for their medicinal value. However there is no scientific evidence of medicinal value of in this.

Effective solutions

Sampling the crops that where not liked by elephants such as lemons, ginger and chilis. Creating alarm system to aware the people when the elephant where percent nearby their area. Just want to train the people who are all living that circumference to guide the elephant away from the agricultural and back to their home range. By using crackers and soft lights to make a noise to scare the elephant’s way from our home range.

Strategies to manage Human-Elephant Dispute

Retaining elephants in their natural habitat: Development and maintenance of perennial water holes. Solar powered bore wells (filling large ponds with solar powered large bore wells).Creation of fodder plantation. Fire management for control of HEC. Grassland management. Management of invasive plant species.

Restricting elephants in their natural habitat: Elephant proof trenches. Hanging fences, Rubble walls, Solar powered electric fence Concrete barriers, Rail fence, Bee hire fence, Bio fence, Chilly fence, Concrete floors.

Monitoring of elephant: Radio collaring, Watch tower, Drones.

Strengthening of elephant corridors: Relocation of villages from elephant corridors, Securement of elephant corridors.

Repellant methods: Fire crackers, drum beating, Bee, carnivore sounds, Use of loud speaker.

Deterrent methods: Acoustic deterrent Light-based deterrents. Agriculture-based deterrents

Replace the elephant's habitation: trained elephants like kumki, Alternate cropping (chilies, citrus, ginger not liked by elephant).

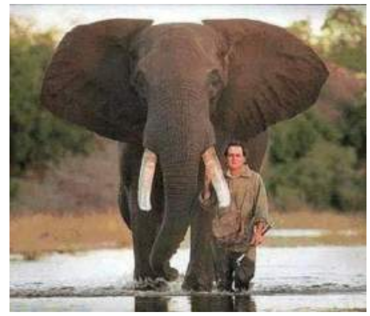
Individual identification and monitoring of elephant: by using sensor and chips can easy to monitor the individual elephants.

Equipping the forest department staffs and communities: High beam torches, Fluorescent jackets, well equipped vehicle.

Emergency measures: Mob control, Ensure clear communication to field officials, Primary response team (forest watchers, village volunteers), Rapid response team, Anti Depredation Squad (trained staff and volunteers), Capture and relocation, Crop compensation, ex gratia payment.

Rescue center establishment and camps for elephant to monitoring the HEC.

Use of technologies to mitigate HEC



Capacity building and awareness among communities: Capacity building, Training of mahouts, Training of departmental staffs, Awareness programmes.

Involvement of other stake holders: Involve police and district administration, Community participation, Involvement of students.

Conclusions

By using the above strategies we can control the conflict between human and elephants. Conflict hotspots can be identified by identifying competitive places (water, land and plant).making the habitat for elephant lives they may avoid the conflict between us. Without this knowledge, we cannot resolving human-elephant conflict.

REFERENCE

- Dr. Prajna Paramita Panda, National Coordinator, Elephant Cell Shri Noyal Thomas, IGF (PE) & Director Project Elephant Shri Soumitra Dasgupta, ADG (Wildlife), MoEF&CC - Best Practices of Human Elephant Conflict Management in India – Ministry of Environment, forest & Climate Change 2020.
- Guidelines for Management of Human-Elephant Conflicts. 2017. PE Division, MoEF&CC.
- Report of National Workshop on Habitat Management for Elephant to Mitigate Human – Elephant Conflict. 20th to 21st January, 2020. Dehradun,Uttarakhand.
- Report of Technical Workshop on Right of Passage to Elephants to Mitigate Human – Elephant Conflict for East-Central Region.1st to 2nd July, 2019.Raipur, Chhattisgarh.

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Effect of Ectoparasitic Infestation in Dairy Animals

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Abstract

Common external parasites that can infest dairy cattle are insects. They comprise a variety of pests, including stable flies, mosquitoes, house flies, horse flies, deer flies, cattle grubs, horn flies, face flies, lice, ticks and mites. Prevalence of ectoparasites was relatively higher in young animals as compare to adult animals. Ectoparasites may cause discomfort, itching decreased productivity, weight loss and transmission of zoonotic Diseases.

Introduction

The majority of the world's cattle, around 1.49 billion cows, are vulnerable to ectoparasite infection. (de León *et al.*, 2020), Because of the immediate result of high infestation on cow health and milk output, arthropods, primarily insects, ticks and mites are the most commercially valuable category of bovine ectoparasites (Wall *et al.*, 2008). Several types of ectoparasite arthropods are vectors of illnesses that elicit bovine diseases that are zoonotic in nature (Garros *et al.*, 2018). Implementing the integrated pest management approach reduces the likelihood of ectoparasiticide resistance while prolonging their lifespan as a helpful tool utilised sensibly with little harm on non-target species (Scasta *et al.*, 2015).

External parasite of dairy animal

Insects are the most common external parasites that may infect dairy cows. They comprise a variety of pests, including stable flies, mosquitoes, house flies, horse flies, deer flies, cattle grubs, horn flies, face flies, lice. Other arthropods such as ticks and mites also cause serious problems (Christensen *et al.*, 1994). Ticks have long been regarded as the most significant ectoparasite limitation to optimal productivity in tropical and subtropical livestock (Debbarma *et al.*, 2018). Ectoparasite incidence in cattle was highest in heifers aged 1 to 3 years (66.66%), trailed by calves aged 1 year (50%), and cows aged > 3 years (44.44%). Ectoparasite incidence rate was highest in

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the summer season (75 percent), preceded by cold season (55%), and rainy season (40%) (Musa *et al.*, 2018).

Economic losses due to various ectoparasitic infestations

Stable flies can reduce milk production by 5%, whereas House flies can reduce milk output by 3.3% (Drummond *et al.*, 1981); when animals are exposed to 66-90 tabanid flies, they lose 0.08-0.10 kg of weight each day, and their feed efficiency drops by 16.9%. The spread of bovine ephemeral fever (loss of draught labour) is caused by Culicoides spp. (biting midges); BT occurrences result in a $6 million dollar loss. Black flies (Simulium spp.) lowered weight gain and milk output by 50%; Mosquitoes lead to an annual loss of $5 million dollars in terms of production and control expenses. Lice cause a total yearly loss of $126.3 million in American cattle. The entire national economic effect of Horn fly is expected to be nearly $98.7 million per year (Rodrigues *et al.*, 2017).

Economic losses in India due to significant vectors-cum-pests of livestock

Pest species	Total milk production in India	Expected decline of milk output	Projected loss in ₹
House flies (non-biting fly)	India produced a total of 13.243 crore tonnes in 2012-13	@3.3% - 4.37 million tones	@ 38 L/Kg = 16606 crore per annum
Biting midges Culicoides (biting and bloodsucking fly)	India produced a total of 13.243 crore tonnes in 2012-13	@18.97% - 25.12 million tones	@ 38 L/Kg = 95463 crore per annum
Ticks (many species)	India produced a total of 13.243 crore tonnes in 2012-13	@23.0% - 30.46 million tones	@ 38 L/Kg = 115748 crore INR per annum

(DADF. 2013-14)

Effect of Ectoparasites on Animal Health

1. Direct Consequence

- Itching and scratching can cause discomfort, which can result in skin and hide injury.
- Diminished productivity (may be due to decreased feeding or unpredictable behavior).
- Difficulty in eating
- Loss of weight

- Deterioration of hearing ability
- Blind-ness.
- Chronic infestations can cause anaemia, loss of weight, and even death in severe cases.

2. Indirect Consequence

- Vector Transmission of Zoonotic Diseases

Vector	Species	Disease	Host
Soft ticks	Otobius species	Tularemia, Q fever	Cattle, sheep, goats and horse
	Ornithodoros porcinus	African Swine fever	Domestic pig
Hard ticks	Ixodes and Rhipicephalus species.	Bovine babesiosis	Bovines, deer and reindeer
	Dermacentor species and hyalomma spp	Equine babesiosis	Horses, mules, donkeys, and Zebras
	Rhipicephalus spp., and Hyalomma spp.	Theileriosis, East Coast Fever, Mediterranean theileriosis	Bovidae and Cervidae species: cow, small ruminants, deer, camels, antelopes, giraffe, and wild ruminants.
Mosquitoes, biting midges	Aedes, Anopheles, Culex species and Deinocerites.	Eastern equine Encephalitis (EEE).	Horses, donkeys.
Culicoides spp.		Blue tongue, bovine, Ephemeral fever, African horse sickness.	Cow, sheep, goats, camel, horse, wild ruminants
Culex spp		Nairobi sheep disease.	Small ruminants

Aedes spp., and Culex spp.		Lumpy skin disease, sheep and goat pox	cow, goats, sheep, camelids, giraffe, antelope
Biting flies	Tabanus & Musca species	Trypanosomiasis	Bovidae & Cervidae species.
	Melophagus ovinus	Blue tongue	Sheep
	Stomoxys calcitrans	Lumpy skin disease	Cow, small ruminants, deer, camels, antelopes, giraffe

Conclusion

It has been concluded that ectoparasites may huge economics and production loss in dairy animals. So strategies can be formulated to minimize the effect of ectoparasites on animals. For this routine deworming and ectoparasiticides like Permethrin, sulfur, lindane, dicophane, benzyl benzoate, ivermectin and crotamiton are used.

References

De León, Adalberto A. Pérez, Robert D. Mitchell III, and David W. Watson. 2020. Ectoparasites of cattle. *Veterinary Clinics of North America: Food Animal Practice*, **36**(1):173-185.

Derek Scasta, J. 2015. Livestock parasite management on high-elevation rangelands: ecological interactions of climate, habitat, and wildlife. *Journal of Integrated Pest Management*, ***6***(1).

Garros, C., Bouyer, J., Takken, W., and Smallegange, R. C. 2018. Pests and vector-borne diseases in the livestock industry (Vol. 5). *Wageningen Academic Publishers.*

Wall, R. L., and Shearer, D. 2008. *Veterinary ectoparasites: biology, pathology and control*. John Wiley & Sons.

Christensen, C. M., Zarlenga, D. S., and Gasbarre, L. C. 1994. Ostertagia, Haemonchus, Cooperia, and Oesophagostomum: construction and characterization of genus-specific DNA probes to differentiate important parasites of cattle. *Experimental parasitology*, ***78***(1):93-100.

Debbarma, A., Pandit, S., Jas, R., Baidya, S., Mandal, S. C., and Jana, P. S. 2018. Prevalence of hard tick infestations in cattle of West Bengal, India. *Biological Rhythm Research*, ***49***(5):655-662.

Musa, S., Ahmed, T., and Khanum, H. 2018. Prevalence of ectoparasites in cattle (Bos indicus) of Jessore, Bangladesh. *Bangladesh Journal of Zoology*, ***46***(2):137-145.

Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India (GOI). Annual Report, 2013–2014.

Drummond, R. O., G. Lambert, H. E. Smalley, and S. E. Ted. 1961. Estimated losses of livestock to pests. In: D. Mente1 Ed.) *CRC Handbook of Pest Management in Agriculture*. CRC Press, Boca Raton, FL

Suárez-Rodríguez, M., and Garcia, C. M. 2017. An experimental demonstration that house finches add cigarette butts in response to ectoparasites. *Journal of Avian Biology*, ***48***(10):1316-1321.

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Application of Biotechnology and Nanotechnology in Livestock Nutrition

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Introduction

Animal products derived from animals fed transgenic forages and eaten by humans are not transgenic in any way Asmare, (2014). This suggests that transgenic forage-fed animal products are safer than modified crops consumed by people. The incorporation of genetically modified corn silage in the diets of dairy cows was shown to have no effect on feed intake or milk output (Phipps *et al.*, 2005). The dairy cows were fed a genetically modified corn silage diet to increase nutritional content but feed intake and milk output were unaffected and there was no transgenic DNA in the milk they produced. As a result, genetically modified foods and plants are being developed to increase nutrition and forage crop genetic modification may lower the quantities of anti-nutritional compounds present in bovine feed components. It has been demonstrated that feeds derived from genetic changes such as grain, silage and hay, resulted in an increase in cattle growth and output (Fereja, 2016). It has been observed that genetically modified feed ingredients with improved amino acid contents can be used to reduce nitrogen flux in pigs and poultry. Thus by escalating the levels of amino acids, requirements of essential amino acid can be met by genetically modified diets that are lower in protein content (Fereja, 2016).

Other biotechnological applications include different classes of feed additives like crystalline amino acids, antioxidants, antifungals, antibiotics and different classes of antibiotic replacers. Feed additives may be added to the diet to enhance the effectiveness of nutrients and they also exert their beneficial effects in the gut or on the gut cell walls of the animal (Yirga, 2015). They are used to increase animal development by improving feed quality and palatability. Furthermore, they are added to the diet in non-therapeutic amounts, shielding the animal against a variety of adverse environmental conditions. Low quantities of chemicals in animal feed may help boost the output of animal protein for human use, lowering the price of the animal product. Avoparcin, zinc bacitracin, spiramycin, virginiamycin, and tylosin phosphate were banned as animal feed additives by the European Union in 1998 and 2006 (Ravindran, 2010). However, in January 2017, the United States imposed a restriction on the use of antimicrobials to enhance the development of food animals (Ramanan, 2017).

The primary goal of probiotic supplementation is to promote a healthy gut flora with the broad goal of preventing or decreasing the effects of enteric infections (Dhama *et al*., 2008). Probiotics increase live weight gain, feed conversion ratio and reducing digestive disturbances by regulating the gut microbial habitat. Antibiotic resistance and drug residues in meat have resulted from the uncontrolled use of antibiotics, hormones and growth factors, particularly antibiotics, which are widely used in the livestock and poultry industries to boost growth, increase body weight, increase feed efficiency ratio and prevent infections. This has had a negative impact on humans, livestock, and poultry. Probiotics may provide protection against toxins generated by pathogenic bacteria by producing vitamins, notably the B-complex group, and digesting enzymes, as well as stimulating intestinal mucosa immunity. Probiotics are so useful in ruminants in preventing illnesses of the gastrointestinal tract in young animals. Yeasts might be employed as probiotics in adult ruminants to promote rumen fermentation. The usage of these feed additives may aid in the production of more homogeneous and high-quality animal products.

Practical application of biotechnology in ruminant feeding

Globally a large amount (90% approx) of genetically engineered crop biomass is consumed by food-producing animals. Probiotics with various beneficial properties have been widely investigated and economically exploited in various products across the world, according to Bahari (2017). During the adult stage of the ruminant, these positive qualities include enhanced rumen microbiota, increased digestion and nitrogen transport into the lower digestive system, and improved meat and milk output. Small ruminants must be raised on nutrient-rich diets with feed additives like probiotics to improve nutrient utilization efficiency in growing ruminants. As a result, the larger the daily feed consumption, the greater the chance of increasing daily output. Probiotic supplementation was found to increase dry matter intake and to improve performance and enhances the immune system of ruminants Bahari, (2017). Probiotics that increase immunoglobulin levels have a more favorable impact on growth, productivity, and illness resistance. Lactobacillus plantarum (which breaks down carbs into glucose) and Aspergillus oryzae (which produces enzymes involved in carbohydrate and fiber digestion) are two examples of such probiotics (Bahari, 2017).

Dabiri *et al.*, 2006 observed that the addition of yeast containing probiotic in supplemental diet of Zandi lambs enhanced growth performance and immune response. Whole crop silage, kernels, and whole crop cobs from genetically altered maize and its isogenic non-genetically modified counterpart were given to these experimental cows. There were no significant variations in the gene expression patterns of cows given either transgenic or near-isogenic meals, according to (Guertler *et al.*, 2012). Similarly, dairy cows, beef cattle and other ruminants were fed recombinant DNA-produced crops and newly expressed proteins in genetically modified plants (Flochowsky and Feedipedia 2012). There were no unintended effects in composition and contamination of genetically modified plants compared with isogenic counterparts. Rather, there were lower mycotoxin concentrations in genetically modified plants with *Bacillus thuringiensis* (Flochowsky and Feedipedia 2012).

Application of biotechnology in pig feeding

The narrow range of feed ingredients available to pig producers has prompted research on the use of low cost, unconventional feedstuffs, which are typically fibrous and abundant (Kanengoni *et al.*, 2015). Maize cob, a by-product of a widely farmed grain, has the potential to be used as a pig feed element. However, the lignocellulosic composition of maize cobs (45–55 percent cellulose, 25–35 percent hemicellulose, and 20–30 percent lignin), which is difficult for pigs to digest, is a major barrier to their usage in pig diets. Simple treatments such as grinding, heat treatment such as sun-drying and fermentation, on the other hand can change the structure of the fibrous components in maize cobs and increase their usage. Fermentation products can fulfil up to 25% of their daily energy requirements in pigs. In addition, dietary fibre enhances pig intestinal health by encouraging the formation of lactic acid bacteria, which inhibit harmful bacteria from proliferating in the intestines. The influence of four microbial phytase (Natuphos) enzymes in the diet on the apparent and real digestibility of Ca, P, CP, and AA in dehulled soybean meal in developing pigs was investigated (Traylor *et al.*, 2001). Supplementation of microbial phytase did not increase the use of amino acids given by soybean meal, but it did improve the calcium and phosphorus consumption of developing pigs fed soybean meal based diets.

Application of biotechnology in poultry feeding

Biotechnology provides several prospects for enhancing agricultural output while also reducing the usage of agrochemicals. In the last several decades, current biology techniques such as genetic modification of rumen microorganisms and chemical and biological treatment of low-quality animal diets to boost nutritional value have become a reality.

Non-nutritive feed additives like xylanases, -glucanases, and phytates are used to counteract anti-nutritional effects in some grains and increase total nutrient availability and feed value. To inhibit auto-oxidation of lipids and oils in chicken diets, antioxidants such as butylated hydroxyl toluene (BHT), butylated hydroxyl anisole (BHA), and ethoxyquin are employed in poultry feeds. Antifungals such as aflatoxins are added to poultry feed ingredients such as grains, groundnut cake and cottonseed cake to control fungi growth in feed and to bind and reduce the negative effects of mycotoxins. In poultry, probiotics are used to stimulate the growth of particular bacteria strains in the intestine at the cost of less favorable microbes. Prebiotics (oligosaccharides) may help to bind unwanted bacteria in poultry's digestive tract. Feeding recombinant DNA-produced crops and newly generated proteins in genetically modified plants to laying hens and broilers did not result in chemical or physical attributes that were different from those fed with native plants, according to (Flochowsky and Feedipedia 2012).

Application of nanotechnology in livestock nutrition and feeding

Nanotechnology is described as the study of nanoscale materials with at least one dimension that are normally between 1 and 100 nm in size (Hill and Li, 2017). Nanomaterials are best referred to as particles. Generally there are three basic systems of nanoparticles; that is, nanoparticles can act as a vehicle for the delivery of substances encapsulated within or conjugated to their surface The use of nanotechnology in animal production is novel, as the livestock business has traditionally relied on antibiotics as growth enhancers (Hill and Li, 2017). However, there are several global concerns with microbial antibiotic resistance and laws and regulations are being updated to prohibit the use of antibiotics in cattle feed. As a result, it has started looking at different options for adding growth boosters and antimicrobials to animal diets. Nanomaterials may be a possible reciprocal to antibiotics and may act as rigid object for pathogens to enter sites of animal production.

Metal nanoparticles with net positive charges are attracted to negatively charge bacterial membranes, resulting in bacterial lysis (Gahlawat *et al.*, 2016). The utilization of nanoparticles for nutrient delivery into cattle feeds has been discovered. Copper is frequently added to diets because, in addition to antibacterial characteristics, it may increase animal development and performance (Solaiman *et al.*, 2007). Gonzales-Eguia *et al.* (2009) found that copper in nanoform might increase energy and crude fat digestion in piglets via the noble effect of lipase and phospholipase-A activity in the small intestine when compared to a copper sulfate-supplemented baseline diet (CuSo4). This has led the foundation for further research into whether antibiotics in feed may be totally replaced by nano-antimicrobials. Furthermore, despite the growth of antibiotic resistance in bacteria, antibiotics have not yet been made completely useless. However, by using nanoparticles as carriers, antibiotic distribution and effectiveness may be improved, resulting in a significant reduction in antibiotic dose necessary for treatment. According to Hill and Li (2017), including nutritional supplements in animal feed, regardless of particle size, may benefit the producer. Further Hill and Li, (2017) explained that if for example, meat and eggs from an animal fed nanoparticle supplements are improved and superior to the original product then they are likely to be favorable to consumers. These researchers mentioned that before the application of nanoparticle in livestock production system, it is important to understand their role as an additive in a biological system and the by-products from that system and to ensure that it is safe for consumption.

References

Asmare B. (2014). Biotechnological advances for animal nutrition and feed improvement. *World Journal of Agricultural Research*, **2**(3):115-118.

Bahari M. (2017). A review on the consumption of probiotics in feeding young ruminants. *Approved Poultry, Dairy and Veterinary Science*, **1**(2).

Dabiri N, Haji mohammadi A, Mahdavi A, Raghebian M, Babaei A and Bahrani M. (2006). Effect of different levels of biosaf probiotic in medium concentrate diet on performance and blood factors of Iranian Zandi lambs. *Journal of Fisheries & Livestock Production*, **4**(4): 1-4.

Dhama K, Mahendran M, Tomar S, Chauhan, RS (2008) Beneficial effects of probiotics and prebiotics in livestock and poultry: the current perspectives. *Intas Polivet*, **9**: 1-13.

Fereja GB. (2016). Use of biotechnology in livestock production and productivities: A review. *International Journal of Research-Granthaalayah*, **4**(6):100-109.

Flochowsky and Feedipedia. (2012). Animal Feed Resources Information System. Braunschweig, Germany: INRA CIRAD AFZ and FAO (c) Institute of Animal Nutrition, Friedrich- Loeffler Institut (FLI) Federal Research Institute for Animal Health.

Gahlawat G, Shikha S, Chaddha BS, Chaudhuri SR, Mayilraj S and Choudhury AR. (2016). Microbial glycolipoprotein-capped silver nanoparticles as emerging antibacterial agents. *Microbial Cell Factories*, **15**:25.

Gonzales-Eguia A, Fu C, Lu F and Lein T. (2009). Effects of nanocopper on copper availability and nutrients digestibility, growth performance and serum traits of piglets. *Livestock Science*, **126**:122-129

Guertler P, Brandi C, Meyer HD and Tichopad A. (2012). Feeding genetically modified maize (MON810) to dairy cows. Comparison of gene expression pattern of markers for apoptosis, inflammation and cell cycle. *Journal Verraucherschutz Lebensmittelsicherh*, **7**:195-202.

Hill EK and Li J. (2017). Current and future prospects for nanotechnology in animal production. *Journal of Animal Science and Biotechnology*, **8**(26):1-18.

Kanengoni AT, Chimonyo M, Ndimba BK and Dzama K. (2015). Potential of using maize cobs in pig diets-A review. *Asian-Australian Journal of Animal Science*, **28**(12):1669-1679.

Phipps RH, Jones AK, Tingey AP and Abeyasekera S. (2005). Effect of corn silage from an herbicide tolerant genetically modified variety on milk production and absence of transgenic DNA in milk. *Journal of Dairy Science*, **88**:2870-2878.

Ramanan L. (2017). India's poultry industry adds to drug resistance. SciDev.Net Asia & Pacific desk.

Ravindran V. (2010). Poultry feed availability and nutrition in developing countries. *Food and Agriculture Organization of the United Nations*, *Poultry Development review. In: Proceedings*, 60-78.

Solaiman SG, Craig TJ Jr, Reddy G and Shoemaker CE. (2007). Effects of high levels of Cu supplements on growth performance, rumen fermentation, and immune responses in goat kids. Small Ruminant Research, **69**:115-123.

Traylor SL, Cromwell GL, Lindemann MD and Knabe DA. (2001). Effects of level of supplemental phytase on ileal digestibility of amino acids, calcium and phosphorus in dehulled soybean meal for growing pigs, *Journal of Animal Science*, **79**:2634-2642.

Yirga H. (2015). The use of probiotics in animal nutrition. *Journal of Probiotics and Health,* **3**(2):132.

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Occupational Health Hazards among Abattoir Workers and Control Measure

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Abstract

Abattoir is the places where animals are slaughtered for meat purpose. Slaughterhouse workers are exposed to a variety of physical, chemical and biological hazards while performing their duties, which can lead to serious health problems. Occupation health hazards into the abattoir worker may be due to the slaughter facilities lacked appropriate equipment's, inadequate abattoir Infrastructure, poor personal hygiene, lack of personal protective equipment, awareness and training to the abattoir workers. Control measures of occupational health hazards among the slaughter house workers included, scientific design of abattoir, environmental hygiene, health, safety and welfare measure must be taken into consideration all the time.

Key words: Animals, Health problem, Slaughterhouse.

Introduction

Work is considered a basic part of our life. Most adults spend about one-fourth to one-third of their time on the job, which is an important part of their lives. Health workers are critical to sustainable social and economic development at the global, national and local levels. In the abattoir animals are slaughtered for food. In abattoir animals should be inspected to ensure that the meat produced is safe to eat. This includes the examination of live animals and the carcasses of slaughtered animals. The meat industry is an important employer for workers. The animals which are slaughter in the abattoir include the sheep, cattle, goats and poultry. The development of the abattoir sector varies from country to country due to cultural diversity, slaughtered species and wealth. These slaughterhouses are often regulated by the government to ensure the health and safety of workers and the hygienic conditions of the meat being distributed. Consumption of meat and meat products has registered a growing trend since the early 1960s.

Exports of meat products increased by 204% during the duration of 1960-2010. While Katare (2020), reported a 500% increase in meat consumption during the duration of 1992-2016. The high levels of waste and organic matter found during animal slaughter not only pose a significant challenge to effective environmental management but can also be contagious to humans. Pathogen found in animal carcasses or shed in animal waste can include rotaviruses, hepatitis E virus, *Salmonella* spp., *Escherichia coli* O157: H7, *Yersinia enterocolitica*, *Campylobacter* spp., *Cryptosporidium parvum*, *Mycobacterium* spp. and *Giardia lamblia*. Pathogens occurred in slaughter animal carcasses and waste generate from animal origin may include *Salmonella* spp., *Escherichia coli*, *Yersinia enterocolitica*, *Campylobacter* spp., *Cryptosporidium parvum*, *Mycobacterium* spp. *Giardia lamblia*, rotavirus, hepatitis E virus. This zoonotic microorganism and viruses can exceed millions of per gram of faeces and can be infected slaughterhouses workers in many ways namely contamination of air, animal origin waste and animal origin meat products, potential exposure vectors like rats, flies, mosquitoes and mice, drinking of contaminated water and consumption of contaminated food by abattoir workers. The effects of a pathogen infection from an animal can lead to temporary illness to the point of death, especially in Pearson immunocompromised and a high-risk person.

Occupational health hazards among abattoir workers

There are many failures in the process of slaughtering of animals that caused meat contamination and allowed transmission of microorganism to slaughterhouse worker due to insufficient infrastructure, unhygienic condition of workers, lack of personal protective equipment, paucity of ante mortem and post mortem inspection facilities and inadequate training to slaughterhouse worker. Occupational infections that are common among slaughterhouse workers may be caused by transmitting agents, including viruses, bacteria, fungi as well as toxins produced by these organisms. Many workers' infections in slaughterhouses can be caused by human behaviour namely repeated contact with infected animals and the retention of water collection in open trenches that favour mosquitoes. Meat processing workers are exposed to various biological agents when handling freshly slaughtered meat and in the presence of sick or infected animals. Health effects can be seen in slaughterhouses workers such as skin diseases, intestinal infections, respiratory infections. Back pain and other muscle problems are caused by overuse and improper posture during the lifting of carcasses of large animals. Slaughterhouse workers, especially those in large animal handling and slaughtering operation, are often exposed to physical hazards namely different cuts on body, needle injuries, back waist injuries, wounds at different parts of body, work stress and back / waist pain, animal kicks, electric shocks and surface floor slippery accidents. Due to operating of different body parts of larges laughter animals and lifting heavy objects, slaughterhouse workers could stress their muscles and different types of joints, thus putting them under greater physical stress and pain. Injuries may be caused by negligence exhibited by some abattoir workers who have failed to use their personal protective equipment. Due to the slippery surface damage occurs on body parts of slaughterhouse workers. This is due poor draining of blood, body fluids, and contaminated water. Due to the lack of use of protective gumboots, abattoir workers susceptible from tetanus and leg ulcers. Also due to lack of use of personal protective coverings and equipment has been recognized as a health risk of brucellosis and tuberculosis in the slaughterhouse workers. Abattoir worker and butchers carry out slaughtering of animals, as well as different animals handling meat are also exposed to different zoonotic diseases namely anthrax, leptospirosis, toxoplasmosis and rabies. Slaughterhouse workers have been exposed to noise, which has led to hearing problems at work.

Poultry processing slaughterhouse workers are permanently exposed to occupational and environmental hazards during the daily poultry processing process. These hazards can be mechanical such as pain, discomfort, severe injuries, musculo-skeletal problems, physical (such as noise, vibration, exposure to cold, and high-temperature), chemicals such as (respiratory problems caused by exposure to dust, micro-organisms, toxic gases and biological infection (Zoonotic diseases) (Mojtaba, 2014). Poultry processing includes the use of sharpened metal tools to separate bone and cut birds in various parts.During these steps of processing and packaging of ready-to-eat chicken, traumatic injuries and musculoskeletal disorders were the main effects on poultry workers' health. These traumatic injuries can result from the widespread use of knives and other sharp instruments. Muscle disorders are of particular concern and are still widespread among workers in the poultry processing slaughterhouse. These disturbances may be caused by the accumulated effects of the rapid and repetitive movements of slaughterhouse workers in poultry processing. Poultry producers who work with poultry are at increased risk of injuries to their hands, wrists and elbows. The slaughter and evacuation procedures of poultry start by loading live chickens into transport trucks, then the workers usually restraints /shackle the birds in a hanging room after which they are stunned, killed, bleeding and removed the feathers. This is followed by gutting, during which the birds are washed and inspected, in addition birds are placed in cooled water baths and anti-microbial agents to reduce bacterial overload. A wide variety of chemicals are available in these facilities where birds are slaughtered and removal of unnecessary parts that can cause an occupational hazard. In these poultry slaughter house hazards comprises nose, eye and respiratory irritation, respiratory associated problems. Excessive heat, high levels of noise and musculoskeletal disorders are also reported. Manufacturing workers often stand for long periods of time and may need to lift heavy objects or use different sharp cutting equipment's, grinding equipment's and handling other dangerous tools and machinery which cause hazards among slaughterhouse workers. In this slaughterhouse worker and butchers increases the risk of evolving occupational related injuries injury. Work-related musculoskeletal problems include conditions in which the nature of the illness involves sprains, stiffness, tears, back pain, carpal tunnel syndrome.

Control measure of work-related health hazards in slaughterhouse workers

1.Abattoir and its facilities to be upgraded: The slaughterhouse must be designed and constructed in such a way that clean and dirty processes and products do not get mixed up. Abattoir owners, managers and slaughterhouse worker keep abattoirs clean inside and outside, dispose of litter, and control of rats, insects, fly. The slaughterhouse should be well ventilated with continuous airflow. An efficient drainage system is essential to keep the slaughterhouse clean. Availability of different section in the abattoir for slaughtering of animals. Proper effluent treatment plant should be available. Meat processing equipment namely tables, hooks and meat cutting machines should be easy to disassemble and remove for easy cleaning. Also, it should be made of non-perishable materials. Sanitation and hygiene facilities should also include a sufficient number of latrines / toilets and hand washing facilities or bathing facilities for slaughterhouse staff.

2. Personal hygiene of abattoir workers: Personal hygiene is very important. Properly washing hands thoroughly with soap and regularly will do a great deal in reducing bacterial contamination. Hand washing facilities should be sufficient if there is enough wholesome water. There should be two places where employees can wash their hands - the living room and the work area where there should be enough hand washing facilities near the work areas. If hand washing systems are located outside of work areas, there is a high risk that they will not be used. Workers should be advised to wash their hands before starting work, after using the toilet, after handling dirty and infectious material, and after eating. Special instructions and note concerning hand washing should be followed. The abattoir authorities may require the use of a particular strong bacteriostatic soap. The use of a nail brush is suggested since germs often hide under and under the nails. Wrist watches other jewellery are not allowed when working in the slaughterhouse, as these things are sources of contamination and can make hand washing difficult. Slaughterhouse workers' clothing must be clean. The aim is not only to protect the abattoir workers from bacteria contamination, but also to protect the meat from different pathogenic bacterial contamination. The use of mild disinfectants is very important to avoid contamination by biological agents in slaughterhouse workers (Khillare and Bhave, 2018).

3. Personal protective equipment's: There are many types of hair covers in the meat industry. It is important that the hair is completely covered from all side and the cover clean. To offer a barrier from meat and environmental exposures, abattoir worker should use personal protective equipment's which protect certain areas of the body that may come into contact with meat and abattoir environment. The personal protective equipment's include disposable gloves for hands, sleeve gloves for arms, goggles or safety glasses for eyes, Face masks and face shields for mouth and nose, head cap. Shoe covers for feet.

4. Awareness of work-related health hazards in slaughterhouse workers: Awareness of work-related health hazards in the workplace is very important for slaughterhouse workers. There are many illiterate workers in the slaughterhouse, which does not know about different types of zoonotic diseases which are transmitted between animal and human.

5. Training to the abattoir workers: The abattoir worker should be trained about occupational hazards before they work in a slaughterhouse. Re-training/ Refresher training should be done regularly from time to time as needed. Training should include information about scientific slaughter of animals, possible occupational hazards, occupational hazards risk for immune compromised persons, use of controls for reducing workplace exposures. Proper Handling of slaughtering an animal, safe handling of meat and meat products, handling of sharp knife and other meat cutting instrument to avoid physical hazards.

6. Health check-up of abattoir workers: Regularly assess the health status of workers/ employees in order to maintain the safety of all slaughterhouse workers. Abattoir worker are examined every six month or yearly for certain zoonotic disease such as brucellosis and tuberculosis.

Conclusion

There are various occupational hazards and health problems may be occurred into the abattoir workers. The government, abattoir owners to ensure the health and safety of slaughterhouse workers. Use of personal hygiene, personal protective equipment's, training, health check-up and awareness about occupational health hazards are control strategies to prevent occupational health hazards among abattoir workers.

References

Katare, B., Wang, H.H., Lawing, J.,Hao, N.,Park, T. and Wetzstein, M. (2020). Toward Optimal Meat Consumption. *American Journal of Agricultural Economics.*, **102**: 662–680.

Khillare, R. S. and Bhave, S. S. (2018). Occupational Hazards Associated with Veterinarians and Their Control Measures. *Journal of Foodborne and Zoonotic Diseases*, **6 (2)**:13-16.

Mojtaba, Y. (2014). Occupational and environmental hazards among poultry processing workers. World Poultry and Ontario Ministry of Labour.

Robinson, P., Morris, D., and Antic, R. (1988). Mycobacterium bovis as an occupational hazard in abattoir workers. *Australian and New Zealand Journal Medicine*, **18(5)**:701-703.