Indian Farmer

ISSN 2394-1227

A Monthly Magazine

Volume: 4 | Issue 06 | June - 2017 | Pages - 71

Doubling Farmers' Income by 2022

www.indianfarmer.net

INDIAN FARMER

A Monthly Magazine

Volume: 4, Issue-06 June -2017

Causes of abortions in cattle

Ankit Kumar Ahuja* and Dipali Parmar

Department of Veterinary Gynecology and Obstetrics,
Guru Angad dev veterinary and Animal Sciences University,
Ludhiana, Punjab-141004.
Corresponding Author: ankit.ahuja1947@gmail.com

Abortion is the expulsion of fetus from the dam before full term usually because the fetus has died in uterus. If fetal death has occurred early i.e. at 1-2 months age then it is called "early embryonic death". Here the fetus is lost without any evident clinical signs. The loss of fetus after 2 months is recognized by evident clinical signs, expulsion of fetus with fetal membranes. When the death of fetus occurred near full term, it is called stillbirth. Main reason behind still birth are difficulty in parturition, factors may be maternal or fetal. Depending upon the cause of "abortion" a cow may experience, fetal loss, embryonic loss or a still birth.

In a dairy herd the abortion rate is 1-2 percent and if it is increased to 3-4 percent then situation become concerned for the farmers and they should begin the investigation to diagnose the root cause of abortion. However to separate the animal is the best possible way to prevent its spreading. To achieve at correct diagnosis it is better to consult the veterinarian and show him/her the aborted animal along with samples of aborted fetuses, placenta and all the clinical signs of dam during abortion.

Diagnosis of etiological factor is a difficult and often frustrating task

To arrive at the correct diagnosis is also a difficult task which is clearly indicated by its low diagnostic success rate is relatively low 30-40% for bovine cases. This can be due to:-

1. Sometimes the difference between the entry of organism and showing the clinical signs is too long that is long incubation period.
2. Fetal death occurs after few hours of expulsion and the lesions are covered by the autolysis of calves.
3. Aborted fetus and fetal membranes are contaminated by environmental agents before examination.
4. Most of the abortion in a given geographical arrears are due to infectious cause about which less is known.
5. Time taken to deliver the sample to the diagnostic laboratories is more which ruins the sample.
6. Improper packaging and handling of the sample leads to poor diagnosis.

A. Non- Infectious causes

a. **Genetic abnormalities** - These are not easily diagnosable factor. Usually an individual cow problem rather than

the problem of whole herd. Mostly the lethal gene present in the genome of animals leads to early embryonic deaths or early abortions. This lethal gene renders the fetus to develop properly and carry out conformational changes in the fetus that proves fatal to fetus.

b. **Heat stress -** Heat stress generally have its effect on the estrous cycle and conception, like buffaloes suffers from summer anestrous. Conception rate during summer or heat stress are decreased. It causes fetal hypotension, hypoxia and acidosis. It can be overcome by using water sprinklers, providing ad libitum water to animals.

c. **Trauma -** Amniotic fluids present in the placenta act as a shock absorber and protect the fetus from any kind of mechanical shock. However if the stress level is high then it can prove detrimental to fetus like surgical stress or vaccination stress or pregnant animal may result in abortion.

d. **Nutritional causes -** Deficiency of various vitamins like Vitamins A and E, minerals like selenium, iodine have been reported to cause abortions in animals.

e. **Toxic agents -** Toxins presents in fertilizer mainly nitrates and nitrites causes abortion in late gestation if present in high doses. Fungal toxins of feed stuff like zearalenone in high levels can cause abortion. Some weed plants like Ponderosa pine needles, Locoweed, Broomweed can cause abortion. Ergot alkaloids are toxins produced by the *Claviceps* fungus, which grows in the seeds of various grasses and small grains is associated with abortions in dairy cattle. Mineral toxicity caused by Lead and Cadmium has also been associated with abortion.

B. Infectious causes

1. Bacterial

Brucellosis - It is caused by *Brucella abortus* in cattle. It causes abortion usually in the last trimester of pregnancy (after 6 months). The fetus may be autolysed or born dead or die after birth. Placenta appears as thick leathery with necrosis of cotyledons. The organism resides in superficial lymph nodes and also has an affinity for erythritol, a sugar present in placenta. Diagnosis is made by serological tests. Prevention can be achieved by calf hood vaccination.

a. **Vibrosis** - It is caused by *Campylobacter fetus venerealis* that usually leads to failure in conception and occasionally causes abortion between 5-8 months of gestation. Mild fetal pleuritis and peritonitis is noticed. Placentitis and edematous inter cotyledonary junction is most often seen. Diagnosis is made by examining the preputial washing of the suspected bull. Vaccination of the bull prior to breeding season must be carried out to prevent the disease.

b. **Leptospirosis** - It causes abortion in the last trimester. Placentitis develops accompanied by dark tan colored cotyledons and hemorrhagic inter cotyledonary area. Fetus usually dies 2-3 days after birth. Leptospirosis is a zoonotic disease and urine and milk of infected animal can cause disease up to 2-3 months. Diagnosis can be done by using dark field microcopy of the organism.

c. **Listeriosis** - it is caused by *Listeria monocytogenes.* It causes placentitis and fetal septicemia. Abortion can occur at any stage of gestation, accompanied by retention of placenta. White necrotic foci are common lesion found in fetal liver. Diagnosis is done by culture of organism from fetal fluid. It is serious zoonosis and spread through unpasteurized milk.

2. Viral causes

a. **Bovine Viral Diarrhea (BVD)** - It is a viral disease and can easily spread via aerosol and contact with the infected animal. It causes fetal death resorption and many dropsical condition of fetus like fetal hydrocephalus etc. Abortions usually occur after 125 days of gestation. Control is achieved by vaccination at early age.

b. **Infectious Bovine Rhinotrachetitis (IBR)** - It is caused by Herpes virus (Bovine Herpes Virus-1) and abortion can occur from 4 months to full term. Autolysis of the fetus is usually present and a white focus on fetal liver is seen occasional. Vaccination of the animal is the best way to prevent the disease.

3. **Fungal causes** - Fungus like *Aspergillus, Mucor* , *Absidia* , or *Rhizopus* are the important causes of bovine sporadic abortion. Abortion occurs most commonly after 4 months of gestation and usually in winter or spring season because during winter animal are kept in confinement and the chances of feeding fungus infected feed is more common. Lesions involved severe placentitis, enlarged inter cotyedonary area with having fungal ringworm like lesion on shoulder and back area.

4. **Protozoal causes**-

a. **Trichomonasis**- It is caused by *Tritrichomonas (Trichomonas) foetus* that usually causes infertility and occasionally causes abortion in the 1st half of gestation. Potato soup like pus is the characteristic feature of this infection. Placenta is often retained and is accompanied by development of pyometra in animal. Diagnosis is made by isolating the organism form the preputial washing of the infected animals. Vaccination can be done to prevent the occurrence of disease.

b. **Neosporosis** – It is caused by *Neospora caninum*. If there is presence of dogs near the vicinity of farm then the chances of abortion dues to *Neospora* are high. Dogs are the definitive host for *Neospora* and can be the source of infection. The dogs transmit the protozoan eggs or oocyts in their feces. Eating the dog feces with the oocyts infects cows. Abortions usually occur in middle of gestation. Diagnosis is achieved by examining the fetal brain and heart lesions in aborted fetus.

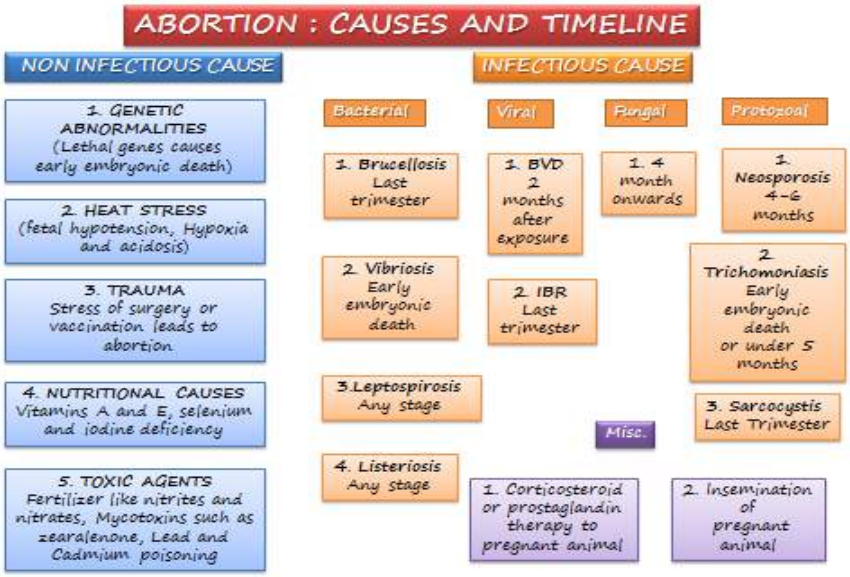
5. Miscellaneous causes

a. Insemination of pregnant animal,
b. Corticosteroid or prostaglandin therapy to pregnant animal,
c. Allergy,
d. Dehydration and stress

CONCLUSIONS

1. Vaccination should be done well before in time to control abortion and biosecurity check to the point so that no economic loss should occur.

2. Vaccine should be kept under proper refrigeration and we must consider the instruction given by the manufacturer so the chance of vaccine failure is minimized.
3. Vaccinations should be given prior to breeding season of animal,
4. Proper monitoring of the reproductive health of the breeding bull should be done to prevent disease outbreak and spreading.
5. For diagnosis adequate fetal sample (aborted fetus, fetal fluid, fetal organs) be sent to the diagnostic lab after proper packaging and following the proper guideline to prevent damaging of sample.



Role of Growth promoters in young Animals

Santosh S. Pathade and Vijay D. Domple

PhD scholar, Division of Extension Education, IVRI

Different categories of feed additives for farm animals are referred to as natural growth promoters (NGPs) or non-antibiotic growth promoters. They are commonly regarded as favorable alternatives to antibiotic growth promoters (AGPs) in livestock production. NGPs include predominantly organic acids, probiotics, probiotics, synbiotics, photogenic, tannins, feed enzymes and immune stimulants. An ongoing search for alternatives has created a large variety of NGPs for pigs, poultry, ruminants and aquatic species.

Advantages:

1) Improve Animal Performance
2) Improve the animal product
3) Economize the cost of animal protein.
4) The main advantage of NGPs over AGPs is that they do usually not bear any risk regarding bacterial resistance or undesired residues in animal products such as meat, milk or eggs. Addition of NGPs to feeds of farm animals may have a number of beneficial effects, including:

- rapid development of a healthy gut micro flora
- stabilization of digestion
- increased growth performance
- stimulation and rapid maturation of the immune system
- reduced incidence of diarrhoea
- improved feed efficiency
- lower mortality rates
- higher profitability

TYPES OF GROWTH PROMOTERS:

There are various types of growth promoters used in livestock which are as follows.

I) Antibiotics:- If has also 2 sub-type

A) Non-Ionosphere
B) Ionophore

A) Non- Ionophore :-

C.g. chlorteracyline, oxytetracycline

Role

1) Reduce incidence of diarrhea in young calves
2) Check subclinical infections and improve growth rate and feed efficiency.

B) Swine: growing finishing pigs

1) Increase growth rate between 10- 20% and feed efficiency improved to the extent of 5-8%.
2) Optimum level 1 to 50 mg/kg.

C) Sows

1) It shortened the weaning to mating interval
2) Increase in litter size

3) Improved quality of milk & weaning weight of 1 kg per piglet.
4) Increase milk fat content and total solids.

D) Poultry

1) A act as antimicrobial agents for prevention & control of cocciodiosis.
2) Improve growth, efficiency of feed utilization.
3) Increase in egg production.

C) Ionophore antibiotic :- It is produced by streptomyes e.g. monesin, lasolacid, salinomycin.

It helps in

i) Improves rumen propionate and decrease acetate concentration
ii) Decrease in level of methane production
iii) Decreases in activity of some rumen enzymes like protease deaminase & urease.
iv) It lowers Ca and K in bone.
v) If increases average daily gain and feed conversion efficiency of growing kids by 10%.

Benefits of antibiotics in animal feed:

1) Daily weight gain
2) Higher feed conversion ratio
3) Leas quantity of manure with nitrogen and phosphorus content

However it was banned in Europe since 1972.

There has been a developing controversy surrounding the use of antibiotics as growth promoters for food animals. These drugs are used at low doses in animal feeds and are considered to improve the quality of the product, with a lower percentage of fat and a higher protein content in the meat. Other benefits of the use of antibiotic growth-promoters include control of zoonotic pathogens such as Salmonella, Campylobacter, Escherichia coli and enterococci. Use of any antibiotic is associated with the selection of resistance in pathogenic bacteria and it has been argued that the use of antibiotic growth-promoters imposes a selection pressure for bacteria that are resistant to antibiotics that may be used in clinical or veterinary practice, thus compromising the continued use of antimicrobial chemotherapy.

Copper supplement :- It acts as

1) growth promoter in pig diets
2) Improve the feed efficiency by 15%

3) Hormones :- Principles secreted by endocrine glands into blood for transportation to target organs and tissues.

4) Two types

a) Anabolic :- Somatotropin, Thyroxin, androgens
b) Catabolic :- oestrogens, Glucocorticoids

it is helpful in

1) Increase nitrogen retention in body, muscle
2) Decreases blood and urinary urea which lead to leaner carcass

BGH :- Bovine growth Harmone, it helps in milk production & meat production, banned in European union.

5) Feed enzyme Additives : If acts as biocatalyst to assist the digestion process and support utilization of nutrients that otherwise go unused.

E.g. B.glucanases, xylanases, protease, pectinase & hemicelluloses etc.

a) **Probiotics** :- Live microbial feed supplement which beneficially affect the host animal improving it intestine microbial balance.(Fuller 1989). Products are available in the form of oral pastes, water dispersible powders or liquids or directly fed feed additives & include microbial cells, cultures & metabolites.

Microorganism used :- Lactobacillus, acidophillus,bifidus bulgarius, fermentum, lactis ruminis, streptococcus

Characteristics:-

1) Culture :- positive effect on host. Gr+ve acid resistant bile resistant & contain 3 x 10^9 (cfu)- colony forming unit
2) High Survival rate & multiply faster
3) Neither pathogenic nor toxic to host
4) Adhesive capability of microorganism
5) Durability

Role:-

1) pigs :- a) prevent & control incidence of diarrhea in pigs

b) Increase weight gain & feed efficiency.

c) Decreases incidence of E-coli Scour

2) Poultry :- 1) Effective in controlling the coli form proliferation

2) Improve Weight gain & feed efficiency.

*** Yeast Culture :-** It composed of living yeast cells which is capable of fermentation & media on which they are grown

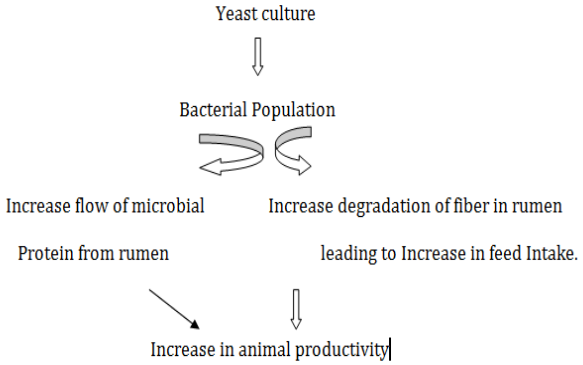
Ex. Saccharomyces cervisiae-facultative anaerobe

Role:-

1) Effect on animal physiology :- Reduce the temperature in heat stressed animal

2) Effect on Rumen :- Production of growth stimulating factors in rumen, stabilization of rumen p^H, Reduction of lactic acid production in rumen.

3) Effect on Milk production :- Diet with 60% Concentrate & 40% straw responded with 18% increase in milk yield.



4) Foals :- 10 gm per/day in 10 weeks of age onwards, increased nitrogen utilization & weight gain, increased hind gut fermentation so increased nutritive value of equine feed.

5) Swine :- Increase performance & feed efficiency in sows & weaned pigs

6) Poultry :-Enhance feed utilization, 1 kg/ton improve weight gain & feed conversion efficiency, decrease morbidity & mortality.

*** DFM:- direct Fed Microbial**

A source of live, naturally occurring microorganism included lactobacillus, streptococcus, bacillus & yeast.

Calves: - Supplements are designed to prevent or reduce E coli scours.

* Acidifiers
1) Formic acid – 6-8 kg/Tons
2) Propionic acid – 8-10 kg/Tons
3) Fumaric acid – 12-15 kg/Tons
Role :-
1) Reduce the Number of piglets with diarrhea after weaning
2) Reduce Ecoli & salmonella population in poultry
3) Influence micro flora of digestive tract which improves utilization of feed nutrient.

*** Antioxidants :-**

It limits the oxidative spoilage by formation of free radicals which prevents formation of undesirable flavor in milk & milk products.

A) Natural :- Vit E, Ascorbic acid

b) Synthetic:- BHA, BHT

*Anticaking agents :- Anhydrous substances that can pick up moisture without themselves becoming wet. E.g. cu. Phosphate, ca. sterate.

* Humectants :- Substances which are required to keep the product moist

* Flavouring agents : To improve palatability and thus feed e.g. ester, alcohols, terpenes.yeast products along with 0.25% MSG for improvement of dry dog food.

Food colors :- Make food moue attractive and pleasing. E.g. Eosine, carmine, B. carotene, chlorophill.

Feed additive sweetners :-1) Natural sugars : sucrose, dextrose, fructose, lactose.2) High Intensity sweetener :- Aspartame, cyclamate, saccharin, monaline improve palatability.

Animals welfare organizations

Santosh S. Pathade and Vijay D. Domple

PhD scholar, Division of Extension Education, IVRI

Animals welfare organizations are close o organizations which are volunteered to help peoples to project their animals It is concerned with the health, safety and psychological wellness of animals. They types of stake holders depend on what type of animals are reared. For convenience four animal welfare classes are made:

1) Farm animal welfarea
2) Wild animal welfare
3) Pet animal welfare
4) Aquatic animal welfare

There are two types of Animal welfare Organizations (AWO) viz., 1. Society for prevention of Cruelty to Animals (SPCA) 1. Animal welfare Organization (AWO) in general.

1. Society for prevention of cruelty to animals (SPCA)

The objectives of SPCA are as follows:

a) Implement the rules provided under prevention of cruelty Act 1960 and register the cases of cruelty to animals and produce the offenders before the police for conviction.
b) Carry on humane animal welfare program me by interacting with schools and educational institutions to create awareness though film show, slide show etc. create kindness club among students, Conduct exhibitions, seminars, camps Field workshops, public meetings, Radio and TV talks on animal welfare. Bring out Animal welfare publications through pamphlets, leaflets, booklets for distribution to public, posting and display of Banners and posters in public places to create awareness.
c) Maintain animal shelter with food and water tough
d) Maintain Mobile ambulatory veterinary clinic.
e) Conduct animal birth control operations for need animal owners as to reduce stray animals.

2) Animal welfare Organization (AWO) in general

The objective of Animal welfare Organization (AWO) will be as follows

a) Promoting Humane Animal welfare Education
b) Maintaining Animal shelter with food and water facilities.
c) They also maintain clinic, Ambulatory clinic, perform Birth control operations.
d) They are focused on Environmental protection and maintain natural and ecological balance.
e) Maintain cooperation with other NGO, police, Courts, Government and public in general.
f) Propagation of Non Vegetarianism with humane slaughter and promoting veganism for those believers.

The following organizations are working for welfare of farm animal, pet and wild animals and mostly it includes

governments and non government organizations.

GOVERNMENT ORGANIZATIONS

1) **National Institute of Animal welfare (NIAW):** It was commissioned under the animal welfare Decision of Ministry of Environment and Forest in 1999 and started it's full- fledged functioning since 2006. Is is presently located in sikri, Ballabgarh, Haryana. It is offers short term trainings to needy people covering mainly on Animal welfare, rights and jurisprudence. It also trains veterinary students in animal welfare under the internship program me. It is currently offering 3 short term courses regularly as follows.

a) Animal welfare (short Term Training Program me)- 4 weeks
b) Animal welfare and jurisprudence -2 weeks
c) Animal welfare and Rights -1 week

2) **Veterinary council of India :**The council was enacted in 1984 under Indian veterinary Act 1984 and was published in the Extraordinary Gazette of India dated 21st August, 1984 to regulate veterinary practice and provide for the establishments of veterinary council of India and state veterinary councils and Management of registrations of veterinary practitioners. This also plays an important role in the ensuring the availability of infrastructure as farm as-well as animals for recognition and de-recognition colleges.
3) **Animal welfare Board Of India :**The main objectives of the board is to prevent any action resulting in the infliction of pain or cruelty and misuse of animals in the country and acts as advisory to the government with regard to the development of law that will fulfill this objective AWBI also publishes ' Animal citizen' jeevan swarthy and AWBI News letter.
4) **State Agriculture Universities/ veterinary collage :** Different Universities and colleges are still in the process of updating and revising. The animal welfare related activities to address animal welfare in its true sense of five freedoms. While teaching/ training the veterinary students university can emphasize use of flash based teachings methods along with plasticized models in order to avoid practicing in the live animals. Teaching can be made more interesting through schematic view, Animation, Text information, videography of the actual dissection and models. Further, universities may also try to implement all the good welfare standards in animal farms, similarly BSc(Forestry) students are also educated in the area of welfare issues in the wildlife.
5) **TANUVAS Distance Education :** Tamil Nadu University of veterinary and Animal sciences, Chennai is offering the distance education courses for the different stakeholder in both local and English language. The detailed information can be obtained by visiting to Animal welfare board of India Website or TANUAS.
6) **Research institute:** Institute**s**, which are working on different research projects might use laboratory animals, Research institutes which are working under the umbrella of ICMR/CSIR/UGC/ICAR are mostly

using the laboratory animals for one or other purposes. It is impossible to conduct the experiments without using the laboratory animals, However, research institutes can make efforts to follow 4R replacement, Reduction, Refinement and rehabilitation approved to reduce suffering of laboratory animals.

7) **Wildlife institute of India :** Wildlife institute of India , Dehradun was set up in 1982 .It function as an autonomous institution to provide training to personnel at various levels for the conservation and management of wildlife to provide information and advice on specific wildlife management problems, to provide a basis for cooperation with international organizations concerned with wildlife management research and training, Further, it is an advisory body to wildlife welfare issues and consultancy services to central and sate government's universities, research institutions and other official and non- official agencies.

8) **Central zoo Authority (CZA) :** The main objective of the authority (CZA) is to complement the national efforts in conservation of wild life. Standard's and norms for housing, upkeep, health care and overall management of animals in zoos have been laid down under the recognition of zoo Rules 1992. Every zoo in the country is required to obtain recognition from the authority for it's operation. The authority evaluates the zoos with recognition from the authority for it's operation., The authority evaluates the zoos with reference to the parameters prescribed recognition and asked to close down only such captive facilities which have neither the managerial skills nor the requisite resources are asked to close down. Each zoo employs minimum of 2 veterinarians who performs major duty in managing rescue operations of captive animals (wild and pet) on the principles of animals welfare.

9) **Veterinary and animal Husbandry department :** Veterinary and animal Husbandry department is main stake holders who are involved in animal welfare activities directly. They are involved in the alleviation of pain and suffering through scientific advisory and treatment of animals.

10) **Municipal corporation of capital cities/ metropolis:** Veterinarian attached to Municipal Corporation are involved in welfare of slaughtering animals, street dogs, companion dogs, cast, pet birds etc. The corporation plays important role in controlling of street dogs, birth controlling of street dogs, birth control programme, humane slaughter in slaughter houses etc.

CLUBS/ FEDERATION:

1) **kennel club of India:** The head office is located in Chennai, Tamilnadu. This is having four zone makes registration of all categories of dog breeds. These zones also conduct the different dog shows at different part of year. This publishes the magazine called Kennel Gazette.

2) **Equestrian federation India (EFI)** : The federation was constituted in 1967 as equestrian Federation of India (EFI) in 1971, EFI became member of federation. Equestre Internationale (FEI). Presently, is is located at

cariappa Marg, Delhi Cantt. All the horses who would like to participate in the several activities of equine can register their animal to the EFI.Federation provides coverage of all equestrian events namely jumping, Eventing, Dresasge, Endurance and Tent Pegging.

NON-GOVERNMENT ORGANIZATION :

Recognized NGO who have registered with Animal welfare board of India are equally contributing to animal welfare. They try to inform the population and raise their consciousness. In general one can say that /NGO exert pressure effectively and are even more successful in addressing a specific issues than what would have been possible other avenues, Different organizations focus on different aspects of animal welfare some of them profess vegetarianism and create public awareness for being kind to the animals. Some others are engaged in establishment of rescue homes, animal shelters, sanctuaries, pinjarpoles, and goushalas, where animals and birds in distress stay under protection. Many organizations are running hospitals and health care centre for animals and birds, maintaining mobile dispensaries and keeping ambulance vans for transporting ill and injured animals. Sterilization of stray animals and offering pets for adoption are also amongst the activities of some of the organizations. However, despite different fields of activities of different animal welfare bodies and humane societies act. The basic objective of their efforts is the same. To prevent unnecessary pain and suffering to the animals and to promote their welfare. The animal welfare organizations, societies and charitable trusts are generally non-profit bodies funded by donations, grants and sponsorships. Any responsible citizen who has a soft corner for animals, birds and wildlife, and is concerned about their welfare, can support the cause of these organizations by acquiring their membership, making donations or supporting them in some other way. Some of the important NGO's working in pursuit of animal welfare has been discussed below.

1) **Royal society for the prevention of cruelty to animals**

It's vision of RSPCA to work for a warld in which all humans respect and live in harmony with all members of the animal kingdom. From endangered whales to fairground goldish, from pet cost to circle lions, RSPCA promoters Compassion for all creatures.

1) **Madras society for the prevention of cruelty to Animal (MSPCA):** Madras SPCA was started in the year 1877, by a band of Englishmen devoted to the cause of animal welfare MSPCA has been in existence for more than a century, as on of the premier Animal welfare Organizations established I this country. The predominant objectives of the society are the prevention and suppression of cruel and improper treatment to animals and amelioration if their condition generally throughout the city of Chennai. The society maintains ambulance for the transport of sick and wounded animals, Veterinary clinic of the society functions all days in the week during specified timings to attend to the needs of sick and firm animals, Treatment is done free of charges. MSPCA also conduct Health

camps at specified locations on request and animals are treated free of cost at that place. The S.P.C.A. is also performing Animal Birth control operations on dogs and cats.

2) **People for the Ethical Treatment of Animals (PETA) :** It is the largest animal rights organization in the world, with more than 3 million members and supporters. PETA focuses its attention of the four areas in which the largest numbers of animals suffer the most intensely for the longest periods of time: on factory farms, in the clothing trade, in laboratories, and in the entertainment industry. It also works on a variety of other issues, including the cruel killing of beavers, birds, and other pests as well as cruelty to domesticated animals. PETA has dedicated veterinarians who work through public education, cruelty investigations, research, animal rescue, legislation, special events, celebrity involvement, and protest campaigns.
3) **People for animals (PFA) :** It is an all- volunteer, not-profit animal started in 1994 by smt. Maneka Sanjay Gandhi who is chairperson of people For Animals. PFA is dedicated to preventing intentional or unintentional harm to all animals in our community with a focus on dogs and cats. PFA keeps its goal to enhance pet quality of life and reduce the number of healthy pets euthanized in shelters: people For Animals provides assistance to pet owners that need financial assistance in having their dog or cat spayed/ neutered.
4) **Blue cross of Hyderabad :** Blue cross of Hyderabad is a registered , non-profit society that works for the welfare of animals in Hyderabad Recognized by animal welfare of India, the organization was started in 1992 by film stars Nagarjuna and Amala Akkineni and supported by like minded animal friendly citizen. Blue cross of Hyderabad has extended help to over 4,00,000 sick, injured and abused animals since inception. Blue cross presently conducts 7 professionally run services for sick and injured ,stray, homeless and working animals in GHMC limits, and campaigns to improve the condition of animals through human attitude, throughout the country.
5) **Compassion unlimited plus Action (CUPA) :** It is an organization for the welfare of animals. A registered public charitable trust, was founded in 1991 by crystal Rogers, an English woman who made India her home. The Activities range from urban stray dog control to load bearing animal relief centre; from a veterinary hospital, emergency care center, and 24/7 animals shelter operation to rehabilitation of wildlife in their indigenous forest zones. CUPA is also involved with legal issues protecting the Interest and welfare of animals, wild and domestic animals,. Is has popularize the compassion for both stray and pet animals though the wiring of columns in local newspapers, thus making it acceptable for urban people to adopt homeless animlas.Today, CUPA in Bangalore is synonymous with animal advocacy and welfare. The Karnataka Veterinary

and fisheries science university (KVAFSU) has generously allowed use of it's land for an animal shelter on their campus in Hebbel, where CUPA provides personalized care for stray, wounded, abused and abandoned animals.

6) **Animals Rights Fund (ARF):** Is was set up in 1999 to collect funds support other animal welfare organizations, It is the nodal agency and make sure that all animal causes got adequate fund. Food and medicines from ARF. Its involvement in spreading the activities relating to ensuring rights of animals., As per guidelines of Animal welfare board of India they are promoting ABC/CNVR (catch, neuter, vaccine &release) program all over India. They have successfully opened many branches all over India more than 100 employees working for the cause if animals. ARF has been fighting legal battles for animals. In our first case we got a ban order for five animals.

7) Centre for Action Research & Technology for Man, Animal & Nature CARTMAN : The society was formed by port N.S. Ramaswamy as its founder president was in October 1981. Padma Bhushan N.S. Ramaswamy was earlier founder director of the Indian Institute of Mangament Bangalore, died on 20 september 2012 at 86 Ramaswany was director of city based NGO Center for Action Research & Technology for Man, Animal & Nature (CARTMAN) in 1972 Ramaswamy who was then the director of National Institute of this NGO were initiated from the year 1986 after the superannuation of pro. N.S. Ramaswamy from ITM(B). One of the first projects taken up was Documentation, Demonstration and Extension for Modernization programme of of Draught Animal power system, it has evolved many designs of improved carts to suit the terrain, animals, types of products carried, etc which can be introduced anywhere in the country and also can local fabricators in their manufacture, karnataka: CARTMAN Ramaswamay no more.

8) Animal Rights International (ARI) : Is was the first organization in the modem era to achieve an animal rights victory; it become one of the most successful in bringing about genuine structural change. ARI grew around a simple concept making the public aware of animal suffering is not enough. By turning words into action, real change is possible and animal suffering can be measurably reduced. ARI was founded in 1974 by the late Henry spira, after he attended a course on Animal Liberation given by the late Henry spira, at New York University.

9) Pet Animal welfare society (PAWS) It came into existence in 1998 with the purpose to make people aware about the care, management and nutrition of pet and stray animals. For PAWS, all animals on this planet are the pets of the society and hence we need to realize their importance in our everyday life and do our bit in exchange. Conducts regular awareness programmes in and around Delhi besides its free-anti rabies camps for strays. The society is doing it's bit to help eradicate rabies and control program. Features of the shelter include indoor/out door runs, cages,

isolation areas and surgical facilities. The shelter provides x-ray, laboratory and intensive care facilities for animals with serious conditions.

10) **Help In suffering (HIS):** It is a registered Indian charitable trust working for the benefit of the animals of India, which was founded in 1980. A new specialized camel Rescue center has been built at bassi. A village on the area road, to save draught camels. Help in suffering provides refuge for many animals, works as a veterinary.

11) **Word society for production of animal (WASPA) Recently remarried as word Animal protection (WAP):** World Animal protection formerly the world sector for the protection of Animals is an international non-profit animal welfare organization that has been in operation for over 50 years. The charity describes its vision as A world where animal welfare was previously known as the world society for the protection of animals (WSPAH). This resulted from the merger of two animal welfare organizations in 1981 the world federation for the protection animals (WFPA) founded in 1953 and the International society for the protection of animals (ISPA) founded in 1959 In June 2014 the charity become world Animal production. The charity has regional hubs in Africa, Asia, Europe. Latin. America and North America and offices in 15 countries. The International office is in London Though WSPA is against the cruel treatment and abuse of animals in general, they also campaign against specific kinds of cruel treatment and abuse, such as bullfighting, bear batting and dancing whaling, the capturing and keeping of dolphins, intensive farming of animals, and the treatment of working equines and pet compaction animals. ASPA also founds and advises member societies working on bear cub rehabilitation and bear sanctuaries, Besides these specific campaigns, the WAPA also advise governments and promotes legislation which would improve animal welfare. Their international campaign for Universal Declaration on animal welfare (UDAW) aims to take a set of principles on respect and protection for animals to the united Nations for endorsement. They also design educational programmers on how to work with and care for animals, including programmes for veterinarians, animals owners and children.

Besides campaigning, the WSPA also actively helps animals in need, such as during the aftermath of a natural disaster or war, Disasters responded to in recent history include the 2004 Tsunami and Hurricane Katrina, where the WSPA provided shelter food and medical care for stray animals. The WSPA also ensured that evacuees from Hurricane paloma in Cuba brought their companions. The WSPA also funds and supports mobile clinics that neuter and spay stray cat and dogs, particularly in countries with ineffective and/ or cruel methods of animal control.

12) **Karuna Society for Animal and Nature :** It has been established in puttaparthi, AP since 2000. It is working mainly for animal welfare

and environment by providing free medical care shelter for sick injured, abandoned and abused animals,

13) **Karuna Animal welfare association for Karnataka:** 1888 as Bangalore society for prevention of cruelty to Animal was registered as charitable society in 1916.It offers services like providing shelter, rescue home to animals, ambulatory services, health camps, human education.

14) **International Animal Rescue :** International Animal Rescue, also known as IAR is and animal welfare non-profit organization based in the united kingdom that comes to the aid of wild and domestic animals with hands on rescue and rehabilitation International Animal Rescues returns rehabilitated animals to the wild while also providing permanent sanctuary for those that cannot be released. International Animal Rescue specializes in comprehensive sterilization and vaccination programs for stray dogs and cats, particularly in developing countries, They also work to educate the public in the humane treatment of all animals, International Animal Rescue has offices in the United kingdom, United states, India, Indonesia, Malta and the Netherlands.

15) **Circle of Animal Lovers (CAL) :** It is a registered non – profitable, non-political charitable animal welfare Non-Government Organization working since 1992 for the cause of animals to ameliorate their condition, The Organization was set up with the aim to prevent cruelty against animals. The main activity of this society is to control the stray dog population though a program of sterilization.

In addition to above, there nearly 3000 registered NGO's are there, which are working for the welfare of the animals directly or indirectly in India. The details can be seen on website of AWBL (awbi.org)

Selection of Dairy Animals for improved productivity

Mamta Janmeda [1], Arun Sharma[2] and Jyotishree Bayan[3]

[1]*Assistant Professor, Department of Animal Genetics and Breeding*
[2]*Assistant Professor, Department of Veterinary Physiology & Biochemistry*
[3]*M.V.Sc Scholar, Department of Animal Genetics and Breeding*
Vanbandhu College of Veterinary Sciences & Animal Husbandry
Navsari Agricultural University, Navsari- 396 450 Gujarat
Email: janmedamamta14@gmail.com

The dairy farming businesses in many tropical and subtropical countries is characterized by large number of cattle and low yield of milk. India possesses over 230 million heads of cattle and buffaloes, which comes to more than one-fifth of the total world population. India possesses rich and diverse livestock genetic resources with 37 well-defined cattle breeds (Screenivas, 2013) and non-descript cattle breeds (Ahlawat and Singh 2005). The majority of the cattle population, about 80%, are nondescript which are intermixed and do not belong to any specific breed.

In general, the indigenous breeds have been evolved through natural selection for adoption to harsh and poor management conditions in different ecological niches over the centuries. Therefore, the indigenous breeds are adapted to harsh climate, resistant to common tropical diseases and can cope with poor quality feed (Joshi and Singh 2005). Most of the cattle indigenous to tropical countries belong to the *bos indicus* type, also called zebu breeds. The defined indigenous breeds can be distinguished into dairy, draft and dual purpose (Joshi and Singh 2005, Hegde 2005) and are usually named after the area, location and habit they occupy. Dairy breeds have higher milk production level compared to draft one. The bulls of the dairy breeds are heavy and slow and cannot be used as draft animals (Hegde 2005). Dairy breeds are Gir, Kankrej, Rathi, Red Sindhi, Sahiwal and Tharparkar. The draft breeds have a low milk production level and the mechanization and commercialization of agriculture has influenced the utilisation of these breeds (Ahlawat and Singh 2005).

In India, at present many milch breeds of cattle yield less than one kg milk per day. The reasons for such a low level of production are listed below:

1. Acute shortage of feed and fodders.
2. Excess cattle numbers.
3. Poor genetic potential for milk production.
4. The smallness of land holdings and consequently small dairy units make them economically unviable. It also

acts against introduction of advanced techniques.
5. Adverse climatic conditions of the tropics.
6. Poor grazing and environmental factors.
7. Inadequate marketing facilities for the products.

GENERAL SELECTION PROCEDURES FOR DAIRY BREEDS:

Proper selection is the first and the most important step to be adopted in dairying. Records are the basis of selection and hence proper identification of animals and record keeping is essential. Cross-breed animals with exotic inheritance of about 50 percent are preferable. This preference is based on comparison of the performance of the animals with different percentage of exotic inheritance. Fifty percent of the native germplasm is helpful to retain the adaptability, heat tolerance and disease resistance traits of local animals, in cross breeds (Boichard *et al*, 2015). The utilization of the Zebu (Sahiwal) germplasm in the formation of breeds like Australian Friesian Sahiwal (50% of Holstein and 50% Sahiwal) and its international recognition as a breed for the tropics is an example.

Maintaining animals sustainable to the situation is the best policy. Bringing animals from different agro-climatic conditions causes problems due to non-adjustment in many cases. In case, purchase becomes absolutely essential so it should be from similar environmental conditions as far as possible. The diversity of the breeding stock and the variation available in economic traits of cattle and buffaloes in the country offer greater challenge and scope for their improvement for the animal breeder. At the same time, the task of improving the genetic make up of a large number of extremely diverse, non-descript low producers is a colossal one. Anyone system of breeding can not be applied uniformly to all the animals in all the areas (Rauw *et al*, 1998).

Selecting a good cow is the most crucial activity for a dairy farmer. Success of the dairy farm depends upon proper selection of cow. The following tips will help in selecting a good cow for a dairy farm:

1. It is advisable not to purchase purebred exotic cows as it is difficult to maintain them under Indian climatic condition. We can select either crossbred exotic or pure bred indigenous milch breed like Sahiwal, Gir, Red Sindhi etc (Figure 1 and 2).
2. Animal should be with attractive individuality with feminity, vigour, harmonious blending of all parts, impressive style and carriage.
3. Whenever an animal is purchased from cattle fair, it should be selected based upon its breed characters and milk producing ability.
4. History sheet or pedigree sheet which is generally maintained in organized farms reveals the complete history of animal.
5. The maximum yields by dairy cows are noticed during the first five lactations. So generally selection should be carried out during first or second lactation and that too are month after calving. Animals in 2nd and 3rd lactation have to be selected preferably immediately after calving (i.e., 30-45 days after calving).
6. Dairymen cull out cows who give less milk. Ask to see records if have any

doubt. Confirm that the milk produced per day is a reasonable amount. Also note the amount of milk produced during peak lactation periods and the number of days the cow is in production. The recommended lactation period of a milking cow is usually 305 days.

7. If the cow is not already pregnant it would be in the best interest of our dairy business to get the cow pregnant as soon as possible and get it in milk. A pregnancy diagnosis with the assistance of a veterinarian should confirm pregnancy. The breeding history should indicate an average of 380 days period between calving.
8. There successive complete milking has to be done and an average of it will give a fair idea regarding production by a particular animal.
9. It is better to purchase the animals during the months of October and November.
10. A cow should allow anybody to milk and should be docile.
11. Maximum yield is noticed till 90 days after calving.
12. Ascertain that selected animals are good milch type.
13. Animal shall have a shining coat, thin and smooth skin with good elasticity.
14. Healthy animals will have bright eyes without discharge, wet muzzle and smooth and shining coat.
15. Animal should have a triangle shape when seen from behind.
16. Udder shall be big, symmetrical, well spread and tightly tucked to the base. Udder of the cow should be soft and spongy without lumps. The milk should flow freely out the end instead of squirting you in the face from a hole in the side. Udder should collapse after milking.
17. Teats should be well shaped and squarely placed.
18. Milk vein on either side of abdomen should be prominent and tortuous with more curves.
19. Animal should have broad chest, big belly with bow shaped ribs.
20. Ears should be alert without discharge.
21. Horns should be smooth.
22. Hoofs should be uniform without lameness.
23. Thorax of the cow should be wide & ribs should be well-arched.
24. Pelvis should be well developed.
25. Calf of the cow must be healthy.

Figure 1: Gir cow

Figure 2: Sahiwal cow

26. A good crossbred cow produces around 15 to 20 liters / day.
27. Dentition is used for assessing the age of the animal. Generally prefer 4 or 6 teeth animals which are calved or pregnant.

THE ANIMAL SHOULD NOT HAVE THE FOLLOWING CHARACTERSTICS:

a) The animals should not suffer from poor growth.
b) Animals should be free from factors like late maturity, not coming into heat, repeat breeder, retained placenta, uncurable chronic diseases etc.
c) There should not be long gap between two lactations.
d) Low milk production.
e) Animals should not be unable to give milk without calf.

Selection for Commercial Dairy Farm:

Purebred indigenous animals continue to be purebred using selective breeding in order to conserve and upgrade the original germplasm. Appropriate advanced means of biotechnology like semen preservation, embryo preservation and the use of sexed semen etc. should be implemented. Donor bulls should to be checked by karyotyping. Selective breeding in indigenous breeds aims to combine better productivity with environment-adaptability. BAIF Development Research Foundation (2013) provided some guidelines, which are as follows:

a) Under Indian condition a commercial dairy farm should consist of minimum 20 animals (10 cows, 10 buffaloes) this strength can easily go up to 100 animals in proportion of 50:50 or 40:60.
b) Middle class health-conscious Indian families prefer low fat milk for consumption as liquid milk. It is always better to go for a commercial farm of mixed type (Cross breed, cows and buffaloes kept in separate rows under one shed).
c) Through study should be conducted of the immediate market where planning to market milk. We can mix milk from both type of animals and sold as per need of the market. Good quality cows are available in the market and it cost around Rs.1200 to Rs.1500 per liter of milk production per day. (E.g. Cost of a cow producing 10 liter of Milk per day will be between Rs.12, 000 to Rs.15, 000).
d) If proper care is given, cows breed regularly giving one calf every 13-14 month interval.
e) Good milk yielding cross breeds (Holstein and Jersey crosses) has well adapted to Indian climate. They are more docile and can be handled easily.
f) The fat percentage of cow's milk varies from 3-5.5% and is lower than Buffaloes.

CONCLUSION

A good dairy cow is not universal and pretty much depends on what we want and where we are. Milk producers for home consumption have different requirements than that of the commercial one. Residents in arid and semi arid areas will choose a different animal from those in high potential areas. If the aim is commercial milk production then naturally we should go for a breed that is known for high milk production regardless of the quality. On the other hand if the aim is butter, ghee or cheese

for the home then the choice should be a cow that has more butterfat in the milk. Different breeds have different demands and our level of preparedness is crucial. We got to make sure that their nutritional needs will be met because it is not just about the initial cost but the subsequent upkeep of the cow. Many dairymen fail here because they go for a cow without making the necessary arrangements. Providing that their nutritional and other needs are met, a dairy cow will produce to its full genetic potential. If we can afford an elite milk cow know that a high milk producer will require high levels of management. On the other hand it would be meaningful to go for a cheaper cow that go well with our level of management. Be aware that dairy producers put on sale cows that are being culled from the herd for not producing enough, cows which have deformities, cows which do not become pregnant, cows with temperamental problems, and cows which are chronic carriers of disease. So keeping in mind above mentioned points, we can go for selection of dairy animals.

REFERENCES

Ahlawat, S.P.S and Singh, P. K. (2005). Conservation and Improvement of Indian Cattle Breeds. In: Proceedings of Vilith National Conference on Animal Genetics and Breeding: 1-12.

BAIF Development Research Foundation (2013). Programmes-Livestock Development. http://www.baif.org.in/our programmes livestock development.asp accessed on 27.10.2013.

Boichard, D., Ducrocq, V. and Fritz, S. (2015). Sustainable dairy cattle selection in the genomic era. *J. Anim. Breed. Genet*: 1–9.

Hegde, N. G. (2005). Promotion of Dairy Husbandry for Sustainable Livelihood Experience of the Bharatiya Agro Industries Foundation. In: Sustainable Agriculture Issues in Production, Management, Agronomy and ICT Applications (eds. A. Bandopadhyay, K.V. Sundaram, M. Moni, P.S. Kundu Mrityunjay, M. Jha). Northern Book Center, New Dehli, 27-34.

Joshi, B. K. and Singh, A. (2005). Indigenous cattle milch breeds-Their potential and improvement programmes. In: Proceedings of Vilith National Conference on Animal Genetics and Breeding: 21-28.

Rauw, W. M., Kanis, E., Noordhuizen-Stassen, E. N. and Grommers, F. J. (1998). Undesirable side effects of selection for high production efficiency in farm animals: a review. *Livestock Production Science*, 56: 15-33.

Screenivas, D. (2013). Breeding policy strategies for genetic improvement of cattle and buffaloes in India. *Vet world* 6 (7), 455-460.

Aflatoxicosis and their Public Health Impact

Raghavendra Prasad Mishra[1*], Udit Jain[1], Barkha Sharma[2] and Alok singh[3]

[1]*Department of Veterinary Public health (DUVASU, Mathura, - 281001, Uttar Pradesh.*
[2]*Department of Veterinary Epidemiology (DUVASU, Mathura, - 281001, Uttar Pradesh.*
[3]*Department of Veterinary Medicine (DUVASU, Mathura, - 281001, Uttar Pradesh.*
**Corresponding author: rmishra523@rediffmail.com*

Aflatoxins are naturally occurring mycotoxins that are produced by *Aspergillus flavus* and *Aspergillus parasiticus*, species of fungi. The native habitat of *Aspergillus* is in soil, decaying vegetation, hay and grains undergoing microbiological deterioration, and it invades all types of organic substrates whenever conditions are favorable for its growth. Favorable conditions include high moisture content (at least 7%) and high temperature (25-32°c).

The name was created around 1960 after the discovery that the source of turkey X disease was *Aspergillus flavus* toxins (Wannop *et al*., 2001). Aflatoxins are toxic and among the most carcinogenic substances known (.(Hulder *et al.,* 1998). After entering the body, aflatoxins may be metabolized by the liver to a reactive epoxide intermediate or hydroxylated to become the less harmful aflatoxin M_1. Aflatoxin-producing members of *Aspergillus* are common and widespread in nature. They can colonize and contaminate grain before harvest or during storage. Host crops, which include maize, sorghum and groundnuts, are particularly susceptible to infection by *Aspergillus* following prolonged exposure to a high-humidity environment, or damage from stressful conditions such as drought, a condition that lowers the barrier to entry. In 2003, 120 people died in Kenya after eating maize with very high aflatoxin levels.

MAJOR TYPES OF AFLATOXINS AND THEIR METABOLITES

At least 14 different types of aflatoxin are produced in nature (Boutrif, et al.,1998). Aflatoxin B_1 & B_2, produced by *Aspergillus flavus* and *A. parasuiticus.* Aflatoxin G_1 & G_2, produced by *Aspergillus parasiticus.* Aflatoxin M_1, metabolite of aflatoxin B_1 in humans and animals (exposure in ng levels can come from a mother's milk). Aflatoxin Q_1 (AFQ_1), major metabolite of AFB_1 in *invitro* liver preparations of Aflatoxin M_2, metabolite of aflatoxin B_2 in milk of cattle fed on contaminated foods (Smith *et. al.,* 1991).

Sources and transmission of aflatoxins

Fungal plant, cereals, milk and milk products, animal and poultry meat and meat products, peanuts, sunflower seed, maize flour, corn and spices are the majoe source of the transmission of aflatoxin. Human get infection by consumption of these products.

Major human disease caused by aflatoxins consumption

It has been estimated that, more than 5 billion people in developing countries worldwide are at risk of chronic exposure to aflatoxins through contaminated foods. Aflatoxins have been recently considered as an important public health issue. Adult humans usually have a high tolerance of aflatoxin, and in the reported acute poisonings, there are usually children who die (Cullen and Newberne, 1994).

Acute aflatoxicosis

It is produced when moderate to high levels of aflatoxins are consumed. Specific, acute, episodes of disease include hemorrhage, acute liver damage which manifests as severe hepatotoxicity with a case fatality rate of approximately 25%. Aflatoxicosis can include anorexia, malaise, and low-grade fever. Acute high-level exposure can progress to potentially lethal hepatitis with vomiting, abdominal pain, jaundice, fulminant hepatic failure and death (Cullen & Newberne, 1994; Strosnider *et. al.,* 2006).

CHRONIC AFLATOXICOSIS

It results from ingestion of low to moderate levels of aflatoxins. The effects are usually-impaired food conversion and slower rates of growth with or without the production of an overt aflatoxin syndrome. Pulmonary adenomatosis. Hepatocellular Carcinoma (HCC), generally in association with hepatitis B virus (HBV) or other risk factors. The International Agency for Research on Cancer (IARC) recognized aflatoxins as carcinogenic in 1976.

DIAGNOSIS

1. History and clinical signs :- The onset of problem may coincide with the delivery of a new feed especially if these clinical signs appears in more than one flock used the same source of feed.
   - By examination of grains or feeds externally show change in colour or growth of fungi and this food is unbalatable for birds.
   - Failure of isolation the infectious agents other than fungi if present that causing mortality and drop in egg production.
   - Persistence of deaths in spite of trials with continuous treatment.
2. Gross and microscoping lesions.
3. ELISA test (Monoclonal antibody detection kits).
4. Cell layer chromatography, gas chromatography or liquid chromatography.
5. Mass spectrophotornetry (mass spectral analysis).

TREATMENT AND PREVENTION OF DISEASES CAUSED BY AFLATOXINS

Some strains of *Lactobacillus* effectively bind dietary mycotoxins. Similarly, clay-based enterosorbents have been used to bind aflatoxins in the gastrointestinal tract. It has been demonstrated that selenium supplementation modifies the negative effects of aflatoxin B_1 in Japanese quail. While butylated hydroxytoluene and levamisole gives some protection in turkeys. Oltipraz,a drug originally used to treat schistosomiasis, has been tested in human populations in China with some apparent success (Bennett *et al,* 2007). Antifungals as organic acids ,copper sulphate , gentin violet, thiabendazde, ammonium hydroxide , must be added routinely to the feeds to prevent fungal

growth in storage pins or finished feeds , other method of prevention include ozone treatment of grain.

REFERENCES

Bennett JW, Kale S & Yu J. (2007). Aflatoxins: Background, Toxicology, and Molecular Biology. In: Simjee S. Infectious Disease: Foodborne Diseases. Humana Press Inc,Totowa NJ, pp 355-373.

Boutrif, E. (1998). *"Prevention of aflatoxin in pistachios".* Food, nutrition and agriculture 21.

Cullen JM & Newberne PM. (1994) Acute hepatotoxicity of aflatoxins. In: Eaton DL,Groopman JD, eds. The toxicology of aflatoxins: human health, veterinary, and agricultural significance, London, Academic Press, 1993:1–26.

Hudler, George W. (1998). *Magical Mushrooms, Mischievous Molds: The Remarkable Story of the Fungus Kingdom and Its Impact on Human Affairs*. Princeton University Press. ISBN 978-0-691-07016-2 .

Smith, John E, Sivewright-Henderson, Rachel. (1991). *Mycotoxins and animal foods*. CRC Press. p. 614. ISBN 978-0-8493-4904-1

Strosnider H, Azziz-Baumgartner E, Banziger M, Bhat RV, Breiman R. (2006). Public Health Strategies for Reducing Aflatoxin Exposure in Developing Countries: A Workgroup Report. Environmental Health Perspectives, 12:1898-1903.

Wannop, C. C. (March 1961). *"The Histopathology of Turkey "X" Disease in Great Britain".*

Zoonotic importance of Brucellosis

[1]Ankit Kumar Ahuja and [2]Dipali Parmar

[1]Department of Veterinary Gynecology and Obstetrics,
[1]Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab-141004.
[2]Division of Veterinary Parasitology, I.V.R.I, Bareilly. U.P
Corresponding Author: ankit.ahuja1947@gmail.com

Brucellosis, also known as "undulant fever", "Mediterranean fever" or "Malta fever" is a zoonotic disease. It is mainly transmitted by consumption of unpasteurized milk, milk products and handling of aborted material from infected cattle. People of all age groups and sexes are affected. Expansion of animal industries like slaughter houses, meat processing plants and the lack of hygienic measures in food handling account for zoonotic occurrence. In many patients disease occurs in mild form hence making diagnosis difficult.

ETIOLOGY

Brucellosis is caused by bacteria of the *Brucella* group with humans as an accidental host. On genetic grounds the *Brucella* group can be regarded as variants of a single species - *Brucella melitensis*. However the infection in other animal may be caused due by *B. abortus, B. suis, B. melitensis, B. neotomae, B. ovis, B. canis*.

DISEASE IN HUMAN

Brucellosis is an acute or sub-acute febrile illness characterized by an intermittent or remittent fever. They include fever, sweats, fatigue, malaise, anorexia, weight loss, headache, arthralgia and back pain. Commonly, patients feel better in the morning, with symptoms worsening as the day progresses. If untreated, the pattern of the fever waxes and wanes over several days ("undulant fever"). Other signs include malaise, anorexia and prostration which may persist for weeks or months in the absence of specific treatment. Typically, enlargement of the liver, spleen and/or lymph nodes may occur. The acute phase may progress to chronic with relapse; there is development of persistent localized infection or a non-specific syndrome resembling the "chronic fatigue syndrome".

TRANSMISSION OF INFECTION

Various routes of infection are:-

1. **Infection from contaminated environment**

- Inhalation of the contaminated aerosol, contamination of the abraded skin or conjunctivae can lead to infection.
- Infected animals kept in close proximity with human can serve as a source of infection.
- Stagnant water reservoir like wells, ponds can be contaminated by waste of recently aborted animals.

2. **Occupational exposure**

- Workers at dairy farm, slaughter house workers, butchers, meat

packers, wool, hide and skin processors are at the great risk of acquiring infection.

- Infection can occur to families who keep their livestock near to the household or are in regular touch of infected animals.
- Use of dried dung as fuel may also impart infection to households.
- Laboratory and vaccine institute staffs working with Brucella culture that are in direct contact of various strains are at greater risk.

3. Foodborne transmission

- Drinking of contaminated milk, milk products like soft cheese, hard cheese and butter milk (mainly) can serve as direct source of infection.
- Procedure involved in cheese making concentrate Brucella organism, where it can survive for many days. Hence storage of such cheese at low temperature should be done before consumption.
- Persons with achlorhydria resulting from disease or through consumption of antacids or H2 antagonists may have an increased risk of acquiring brucellosis through ingestion of contaminated foods.

SIGN AND SYMPTOMS

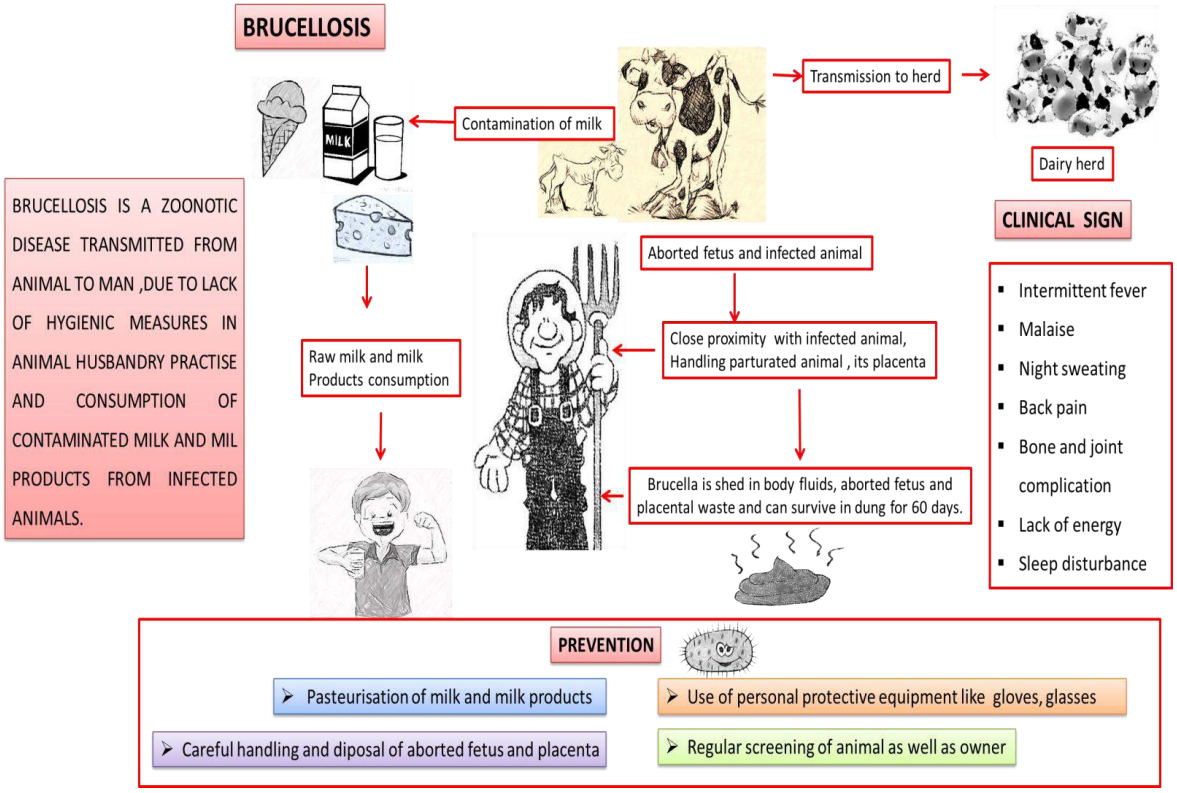
Intermittent or remittent fever accompanied by malaise, anorexia and prostration are the typical signs of Brucellosis. Complaints may persist for weeks or months in the absence of specific treatment. Enlargement of the liver, spleen and/ or lymph nodes may occur. Brucellosis mostly occurs in acute form with an incubation period of two to three weeks. Commonly patients feel better in the morning, with symptoms worsening as the day progresses. Patients have strong desire to rest and are depressed. Fever, chills, sweats, aches, lack of energy, joint and back pain, headache and loss of appetite are main signs observed. Arthritis, constipation, abdominal pain and sleep disturbance may also occur. Cough, testicular pain, rash, ill appearance, pallor, vaginal bleeding, hepatomegaly, splenomegaly, lymphadenopathy are rarely observed. Bone and joint complications are the most frequent complications found in Brucellosis. Typically these febrile patients may be referred to as patients with pyrexia of unknown origin or the symptoms and signs are confused with those of other diseases such as typhoid fever, rheumatic fever, spinal tuberculosis, autoimmune disease, and tumors.

Because of the deceptive nature of the clinical signs and symptoms of brucellosis the disease may be easily misdiagnosed. Therefore, alertness of practitioners and health workers as well as the availability of laboratory facilities for diagnostic testing are essential.

PREVENTION

1. Educating people to avoid consuming unpasteurized milk and milk derivatives including milk, cheese, ice cream and butter milk.
2. Barrier precautions for slaughter house person and professionals at risk (butchers, farmers, slaughterers, veterinarians).
3. Careful handling and disposal of fetus as well as placenta, especially in cases of abortion.
4. Serological or other testing of animals.

5. Immunization of herds/flocks may be envisaged.
6. Eliminate and quarantine of infected herds/flocks.



Affections of Teat and Udder in Dairy Animals

Preethi K and Rajasri M

Ph D Scholars, College of Veterinary Science, PVNRTVU,
Rajendra nagar, Hyderabad-30, Telangana.
Corresponding address:- konka.preethi@gmail.com

The udder and teat affections always lead to economic loss in milk yield, possible loss of quarter if there is a necessary to dry off, and finally reflects on the economic value of dairy animal. Hence, a better knowledge on udder and teat surgical affections and abnormalities is found to be highly needed (Schukken, et al, 1992). The present demand for high milk production exposes the teat of dairy cattle to vigorous manipulation and high risk of injures. Injures to the teat can be caused by various factors including trauma, infection, husbandry practices and environmental factors (Ghamsari,et al, 1995). Mahdy (1998) stated that there was a positive relationship between claw, joint affection and teat affections. This was also mentioned by and the overcrowded cows were more exposed to other animal's bits, horns and stepping on the teats by neighboring animals resulted in teat injures (Nouh et al ., 2014).Surgical affections of the udder and teats may be congenital or acquired.

CONGENITAL ANOMALIES

1. Absence of the udder: Is exceedingly rare and only met with in cases of hermaphrodism.
2. Supernumerary glands: Occurs only in multi-parous animals.
3. Absence of the teat.

SUPERNUMERARY TEATS

This may occur and can be present anywhere on the udder but are most frequently seen posterior to the last two normally placed teats. It is better to amputate the accessory teats when that animal is young heifer, before the gland becomes active. It is essential that care must be taken to assure that only the supernumerary teats are removed and not normal.

CONTRACTED SPHINCTER OR TEAT ORIFICE OR HARD MILKER

The condition may be congenital in origin or may be acquired as a result of trauma to the end of the teat. There is a small stream of milk, and prolonged milking

time. There may be loss of milk due to incomplete milking or trauma to the teat due to attempts for strenuous milking methods. Under local anaesthesia in to teat canal the orifice should be cleansed, antiseptic applied, and the orifice enlarged by inserting lichty teat knife, ringed teat slitter or stoll teat bistoury. The opening in the sphincter is maintained at the desired size by inserting a Larson teat tube and leaving it in place for 5-7 days. Milking is accomplished by removing the cap of the tube.

Enlarged teat orifice "Free Milker" or Leaker

This condition is due to a relaxed or a traumatized sphincter. Milk leaks from the teat at times other than milking and result in milk loss. The condition may be helped by injecting small amounts of sterile mineral oil or lugol's solution around the orifice to reduce its size to the desired effect. This may have to be done more than once to obtain the optimal size for milk flow. If it is overcorrected it results in stenosis and handle as contracted sphincter or orifice.

Occlusion of the teat orifice

This is a congenital anomaly characterized by the occlusion of the teat orifice with milk at the time of lactation. It may also be acquired as a result of trauma at the teat orifice that results in healing with occlusion. A small amount of local anesthetic is injected into the area. Insert a septic hypodermic needle where the opening should be located. Insert the needle into the teat canal until milk flows out; then withdraw the needle and enlarge the opening as described for contracted sphincter.

ACQUIRED SURGICAL AFFECTIONS

Lacerations

Lacerations or trauma in the area of the teat sphincter may lead to stenosis. If there are flaps of skin that protrude, they should be sutured or removed. Portions of nonviable skin should be trimmed back to confirm to normal contour of the teat. Sutured wounds may be protected by a wrap of an adhesive elastic bandage. The insertion of a Larson-type teat tube to facilitate milking is of value to the person milking as well as to the animal because the pain associated with the trauma. Replacing the cap on the tube after milking will reduce the possibility of mastitis.

Teat Fistula

Teat fistula refers to an opening in the wall of the teat, connecting the exterior to the pre-existing channel and characterized by persistent outflow of milk. Such fistula may be congenital or acquired. It is mostly acquired as a result of penetrating wound that extend to the teat canal or cistern and fails to heal completely because of the continuous drainage of milk. The outstanding signs consist of tract and milk coming through it at milking time. Under local anaesthesia suturing is carried out in two rows

including all layers with the exception of the mucosa using non absorbable, noncapillary suturing material.

Haematoma of the Udder

Haematoma of the udder is relatively common in cattle having pendulous udder as a result of contusion and rupture of a subcutaneous blood vessels. The condition is characterized by its sudden onset and fluctuency. A septic puncturing the swelling may be necessary to confirm diagnosis, but this is not preferable. If the haematoma is subcutaneous, it can be palpated out, if parenchymatus it cannot be detected by visual examination and the diagnosis in such cases depends upon the sudden onset of bloody milk. Haematomas in front of the udder should not be opened till the blood is clotted, usually after 10 days. The blood clot is removed and the cavity is painted with tincture of iodine. The cavity is then packed tightly to guard against further bleeding.

Lactiferous Calculi (Milk Stones)

Milk stones which are found in the udder may result from accumulation of lime salts of milk over a point of crystallization. The latter may be desquamated epithelium. Sometimes, these calculi are freely movable in the teat canal if their sizes are relatively smaller than the diameter of the canal. When being larger in size, they obstruct the lumen of the teat canal. If the calculi are of small size, they can be removed by manipulation during milking. Larger calculi obstructing the teat canal can be crushed by means of special forceps.

Abscess of the Udder

Abscesses of the udder may develop beneath the skin as a result of infection of a haematoma. It may occur in the parenchyma of the udder as a result of chronic mastitis especially in goats. It may also occur as a result of supramammary lymphadenitis. Generally, abscess formations most commonly occur secondary to the traumatic wound. The treatment should be done on the general principles for treatment of abscesses. If there are multiple abscesses, mastectomy (partial or total) according the involvement of one quarter or more on the entire udder, is then indicated. If there is involvement of the supramammary lymph node, lymphadenitis it should be extirpated.

REFERENCES

Ghamsari SM, Taghugi K, Abe N, Acorda JA, Sato M and Yamada H. Effect of different suture patterns on wound healing of the teat in dairy cattle. J. Vet. Med. Sci. 199;57: 819-824.

Mahdy AEE (1998). Teat surgery in dairy animals .Ph.D. of Vet.Med.(surgery), Zagazig University.

Schukken YH, Lesile KE, Weeersink AJ and Martin SW. Ontario bulk milk somatic cell count reduction program. J. Dairy Sci. (1992);75: 3352-3358.

Nouh SR, Korittum AS, Elkammar MH, Barakat WM. Retrospective study of teat surgical affections in dairy farms of armed forces and their treatment. Alexandria Journal of Veterinary Sciences 2014, 40: 65-76

Fruits and Fruit Peels as Antimicrobial Source for Different Meat, Fish and Milk Products: A Novel Approach

Jyotiprabha Mishra[*1], Nihar Ranjan Sarangi[2], Rashmi Prabha Mishra[3], N Kumar[4] and Bidyut Prava Mishra[5]

[1]*Scientist, Animal Science, Krishi Vigyan Kendra, Sambalpur, Odisha.*
[2]*Additional Veterinary Surgeon, Bhanjanagar, Odisha.*
[3]*Programme Assistant (Fishery Science). Krishi Vigyan Kendra, Angul, Odisha.*
[4]*Fisheries Extension Officer, Muzaffarpur. Bihar, India.*
[5]*Assistant Professor, LPT, O.U.A.T, BBSR, Odisha.*
[*]*Corresponding Author: mishrajyotiprabha@gmail.com*

The introduction and increasing use of antibiotics for antibacterial therapy has put forward a rapid development and also creates way for expansion of antibiotic resistance in human pathogens. Infectious diseases have played a major part in shaping human history but with that human mind also tried its level best to find out the solution through the advancement of medical science by different modern tools and techniques. It is widely accepted that the augmented availability and the use of various antibacterial and antifungal agents in recent years has resulted in the control and even eradication of diseases, but it has also led to the development of resistant strains. Infectious diseases caused by bacteria and fungi affect millions of people worldwide due to the global emergence of multi-drug resistant bacterial strains; it is increasingly limiting the effectiveness of current drugs and significantly causing treatment failure of infections. In this regard it is utmost important to consider the natural antimicrobial sources to combat the antibiotic resistance.

Fruit peel: Friendly source of natural antimicrobials:

Several scientific investigations point at consecutive rich sources of antimicrobics, especially among fruits and vegetables, but only few of them gave importance to the waste parts of fruits, i.e. seeds and peels. Fruits and vegetables wastes and by-products, which are produced in great amounts during industrial processing influences the environment in negative way and this need to be taken care or utilized. On the other hand, they are very rich in bioactive components, which are considered to have a beneficial effect on health. Plant waste is prone to microbial spoilage; therefore drying is compulsory before further processing. These are novel, natural, environment friendly and also act as economic sources of antimicrobics, which can be used in the prevention of diseases and also it will alleviate the problems of pollution.

Types of fruits act as antimicrobial source are: Coconut, orange, banana**,** lemon**,** mango**,** water melon**,** pomegranate and grapes etc.

Citrus fruits: Citrus peel contains essential oils (90% D-Limonene) which are known as antimicrobial agents. Essential oils are used in the manufacture of food and medicines as flavoring agents, cosmetics and domestic household products. Before extract D-Limonene carry out anaerobic digestion of orange peel waste has to be done after a pre-treatment.

Orange: There are significantly more numbers of enzymes, flavonoids, and phyto-nutrients in the peel of the orange rather than the fruit. The peel is where all the essential components accumulate and they may be found in three main sections of the peel; the flavedo, albedo, and oil sacs. Also it contains substantial amount of vitamin C, vitamin B1, choline, folic acid, over 60 known flavonoids, d-limonene, alpha-carotene, beta-carotene, aldehydes, numerous minerals and vitamins. Orange peel acts as anti-inflammatory due to the more flavonoid content, and also acts as an anti-bacterial and anti-microbial agent. One of the major components of orange peel (d-limonene) has been reported to have anti-carcinogenic activities. It is used in traditional Chinese Medicine to "reduce accumulation," whether gas in the intestine, pressure from cramping, stool in the bowels, phlegm in the lungs and throat, or "too much blood energy" resulting in high blood pressure.

Grapes: The antimicrobial activity of acetone: water: acetic acid and methanol: water: acetic acid extracts from grape seed also have been reported. Both extracts were active against *Bacillus cereus*, *Bacillus coagulans*, *Bacillus subtilis*, *S. aureus*, *E. coli* and *P. aeruginosa.*

Pomegranate: *P. garantum,* have been reported to have antimicrobial activity against a range of Gram positive and negative bacteria. Antimicrobial activities of combinations of pomegranate rind extract with range of metal salts with the addition of vitamin C phytochemical analyses was made to evaluate the active inhibitors in rind extract, including phenolics and flavonoids.

Banana: The fruit averages 125 grams (0.28 lb), of which approximately 75% is water and 25% dry matter. Each individual fruit (known as a banana or 'finger') has a protective outer layer (a peel or skin) with an edible inner portion. Because they contain vitamin A, bananas and plantains helps in digestion, and it is reported that boiled, mashed ripe fruit can be good for constipation, especially when mixed with other recommended plants. The juice from the male bud provides a noticeable remedy for stomach problems. The pounded peels of ripe bananas can be used to make a poultice for wounds and, as the inside of the peel has anti-septic properties it can be wrapped directly around wounds or cuts in an emergency. In Nigeria, a weaning food based on plantain and soybean has been developed which is nutritious for babies and can be used as a therapeutic diet for the treatment of malnutrition and kwashiorkor, which results from protein deficiency.

Coconut: Immature or Green Coconut has medicinal properties like it acts as effective oral dehydration solution, relieves rashes from chickenpox & measles, kills intestinal worms, decreases

urinary infections. The great majority of dietary fats are composed of long chain fatty acids (LCFAs). The composition of coconut oil is unique in that it contains predominantly medium chain fatty acids (MCFAs). The medium chain triglycerides (MCTs) in coconut oil are broken down into medium chain fatty acids shortly after ingestion which is then transported across the intestinal wall through the portal vein directly to the liver to be utilized as an energy source. Although medium chain triglycerides (MCTs) and diglycerides in coconut oil have no significant antimicrobial properties but MCFAs and monoglycerides have effective antimicrobial activity. The 3 most important antimicrobial MCFAs in coconut oil are: caprylic acid (C8)–7.8% capric acid (C10)–6.7% lauric acid (C12)–47.5%. Published medical studies show that MCFAs in coconut oil are: anti-bacterial, anti-viral, anti-fungal and anti-parasitic in nature.

Mango: It contains polyphenols as antimicrobial component and has 60% peels and kernels. Also it contains gallotannins which are having highly selective antibacterial activity**.** Gallotannins have the potential of tanning and iron-binding activities**.**

Watermelon: Watermelon juice is enriched with lycopene, minerals and vitamins such as A, B and C. Regular consumption of watermelon juice can augment blood concentration of lycopene and beta-carotene (natural antioxidants) which are having protective effects against cardiovascular diseases and certain cancers (prostate, bladder, and cervical cancer). The nutritional property of watermelon juice can be increased by incorporation of different probiotic lactobacilli. Studies reported the antimicrobial activity of watermelon juice probioticated using different strains of lactobacilli against *Salmonella typhimurium.* All of the lactobacilli could inhibit growth of *S. typhimurium with L. casei being the most potent. S. Typhimurium* was totally eradicated in probioticated watermelon juice after 2-6 h.

Apple: The potential antiquorum sensing activity of the apple extract was tested by using the microorganism Chromobacterium violaceum. Ultra-performance liquid chromatography revealed that rutin, epicatechin, dicaffeoylquinic acid, and caffeic acid were the most abundant phenolic compounds in the extract; these compounds constituted 27.43%, 24.93%, 16.14%, and 15.3% of the total phenols, respectively. The test for 2, 2-diphenyl-1-picryl-hydrazyl free radical-scavenging activity showed that the extract possessed an impressive antioxidant capacity (50% effective concentration of 2.50 µg/g of product). Furthermore, the extract clearly exhibited antimicrobial activity against Bacillus cereus (11- to 14-mm diameter of inhibition halo, depending on the strain) and Escherichia coli. Apple peels contain ursolic acid in largest quantities. Ursolic acid is known as antibacterial, anti-inflammatory, and antifungal properties.

CONCLUSION AND FUTURE ASPECTS

It is known that the by-products of some vegetables and fruits represent an valuable source of sugars, minerals, organic acid, dietary fiber and phenolics that have a wide range of action, which includes antitumoral, antiviral,

antibacterial, cardio protective and antimutagenic activities. Thus new aspects with reference to the use of the wastes from fruits therapeutically are very attractive. Fruit peels may help to discover new chemical classes of antibiotic for control of deadly diseases. These are novel, natural and economic sources of antimicrobics, which can be used in the prevention of diseases caused by pathogenic microbes. Therefore, this study will provide an ample of scope for future utilization of the waste for medicinal purpose.

FURTHER READING:

Akram M, Shahid M, Khan AU. Etiology and antibiotic resistance patterns of community acquired urinary tract infections in J N M C hospital Aligarh, India. *Annals of Clinical Microbiology and Antimicrobials*. 2007;6: 4-10.

Bergdoll MS, Reiser RF, Crass BA, , Robbins RN, Davis JP. A new staphylococcal enterotoxin, enterotoxin F associated with toxic-shock syndrome *Staphylococcus aureus* isolates. *The Lancet*. 1981;317: 1017 1021.

Fluit AC, Visser MR, Schmitz FJ. Molecular detection of antimicrobial resistance. *Clinical Microbiology Reviews.* 2001;14: 836-871.

Hancock EW. Mechanisms of action of newer antibiotics for Gram-positive pathogens. *Lancet Infectious Diseases.* 2005;5: 209- 218.

Isturiz R. Global resistance trends and the potential impact on empirical therapy. *International Journal of Antimicrobial Agents.* 2008;32: S201-S206.

Kauffman CA, Hedderwick S. Opportunistic fungal infections: Superficial and systemic candidiasis. *Geriatrics*. 1997;52: 50–54.

Murphy CA, Belas R. Genomic rearrangements in the flagellin genes of *Proteus mirabilis. Molecular Microbiology*. 1999;31: 679–690.

Norrby SR, Nord CE, Finch R. Lack of development of new antimicrobial drugs: a potential serious threat to public health. *Lancet Infectious Diseases.* 2005;5: 115-119.

Sundsfjord A, Simonsen GS, Haldorsen BC, Haaheim H, Hjelmevoll SO, Littauer P, Dahl KH. Genetic methods for detection of antimicrobial resistance. *Acta Pathologica, Microbiologica et Immunologica Scandinavica*. 2004;112: 815-837.

Various on-going extension programmes in agricultural and allied sectors in Telangana State

Palve Gajanand[1*], L. Raja[2], D. Karthik[3] and S. Ashokkumar[4]

Ph.D Scholars, Dept. of Dairy Extension Education,
National Dairy Research Institute (NDRI), Karnal, Haryana, India.
Corresponding Author: gajanandpalve222@gmail.com

RASHTRIYA KRISHI VIKAS YOJANA (RKVY):

Government of India launched an additional Central Assistance scheme i.e. Rashtriya Krishi Vikas Yojana (RKVY) during XI plan period to incentivize states for increasing investments in Agriculture and Allied Sectors. The RKVY funds would be provided to the States as 50% grant by the Central Government and 50% by State Government. The Govt. of India has continued the RKVY in XII five year plan period in a holistic manner to achieve 4% annual growth.

Objectives

- To incentivize the states so as to increase public investment in Agriculture and Allied sectors.
- To provide flexibility and autonomy to the States in the process of planning and executing programmes for Agriculture and Allied sector schemes.
- To ensure that the local needs/crops/priorities are better reflected in the agricultural plans of the states.
- To achieve the goal of reducing the yield gaps in important crops through focused interventions.
- To maximize returns to the farmers in Agriculture and allied sectors.
- To bring about quantifiable changes in the production and productivity of various components of Agriculture and allied sectors by addressing them in a holistic manner.

Departments involved in RKVY:

Agriculture & allied sectors such as Agriculture, Horticulture, Animal Husbandry, Fisheries, Dairy Development, Prof. Jayashanker Telangana State Agriculture University, Sri. Konda Laxman Telangana State Horticulture. University, Sri. P.V.N.R.Telangana State University for Veterinary,Animal and Fisheries Science. T.S Agros, Sericulture, T.SMARKFED, Telangana State Warehousing Corporation, Marketing (Rythubazar) & Food Processing (Industries) etc., are involved in RKVY.

NATIONAL FOOD SECURITY MISSION:

National Food Security Mission (NFSM) was launched in October 2007, The Mission was met with an overwhelming success and achieved the targeted additional production of Rice, Wheat and Pulses. The Mission is being continued during the 12th five year plan with new targets of additional production of food

grains i.e. Rice, Pulses and Coarse Cereals. The National Food Security Mission (NFSM) during 12TH five year plan, Telangana State has four components. 1) NFSM – Rice 2) NFSM – Pulses 3) NFSM – Coarse Cereals and NFSM Commercial Crops.

Objectives:

- Increasing production of rice, pulses, Coarse cereals and commercial crops through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country
- Restoring soil fertility and productivity at the individual farm level and Enhancing farm level economy (i.e. farm profits) to restore confidence amongst the farmers.

NATIONAL MISSION ON OILSEEDS & OIL PALM (NMOOP):

The Department of Agriculture & Co operation has been decided to continue the National Mission on Oilseeds & Oil Palm (NMOOP) Scheme during the year 2015-16 under 12th Plan. During the last few years, the domestic consumption of edible oils has increased substantially and has touched the level of 18.90 million tonnes in 2011-12 and is likely to increase further. It is, therefore, necessary to exploit domestic resources to maximize production to ensure edible oil security for the country.

Objective

- The NMOOP envisages increase in Production of vegetable oils sourced from Oilseeds, Oil palm and TBOs from 7.06 million tonnes (average of 2007-08 to 2011-12) to 9.51 million tonnes by the end of Twelfth Plan (2016-17). The Mission is proposed to be implemented through three Mini Missions with specific target as detailed below:

Mini Mission (MM): Target of 12th Plan

- MM I on Oilseeds: Achieve production of 35.51 million tones and productivity of 1328 kg/ ha of oilseeds from the present average production & productivity of 28.93 million tonnes and 1081 kg/ha during the 11th Plan period respectively. This Scheme will be implemented by Department of Agriculture.
- MM II on Oil Palm: Bring additional 1.25 lakh hectare area under oil palm cultivation through area expansion approach in the States including utilization of wastelands with increase in productivity of fresh fruit brunches (FFBs) from 4927 kg per ha to 15000 kg per ha. This Scheme will be implemented by Department of Horticulture.
- MM III on TBOs: Enhance seed collection of TBOs from 9 lakh tonnesto 14lakh tonnes and to augment elite planting materials for area expansion under waste land. This Scheme will be implemented by Department of Forestry.

STRATEGY:

- Increasing Seed Replacement Ratio (SRR) with focus on Varietal Replacement.
- Increasing irrigation coverage under oilseeds from 26% to 36%.
- Focus on low productivity and high potential districts
- diversification of area from low yielding cereals crops to oilseeds crops.
- inter-cropping of oilseeds with cereals/ pulses/sugarcane.

- Sowing of Oilseeds in fallow lands after paddy Harvest.
- Promotion and extension of improved technologies i.e., Quality seed, integrated nutrient management (INM) including micronutrients, soil amendments, integrated pest management (IPM), input use efficiency and resource conservation technologies along with capacity building of the farmers/extension functionaries. Integration of various proposed interventions and targets with the district plan of each identified district.
- Constant monitoring and concurrent evaluation by the implementing agencies for assessing the impact of the interventions for a result oriented approach.
- The scheme would be implemented in a mission mode through active involvement of all the stakeholders.
- Close monitoring of flow of funds to ensure that benefit of the Mission reaches the targeted beneficiaries in time to achieve the intended results.

NATIONAL MISSION ON AGRICULTURAL EXTENSION & TECHNOLOGY (NMAET):

The main objective of the scheme is transfer of technology and efficient input management for better production. It is important to disseminate information about new technologies, so that the farmer is able to make use of the latest agricultural developments. This mission is implementing with 4 sub-missions namely i) Sub mission on Agriculture Extension, ii) Sub mission on Seed and Planting Material, iii) Sub mission on Agricultural Mechanisation and iv) Sub mission on Plant Protection and Plant Quarantine.

Sub mission on Agriculture Extension (SMAE): (ATMA)

Extension Reforms (ATMA) scheme is in implementation in (9) districts of Telangana with 50:50 central and state share. During the year 2005-06, (3) districts namely Adilabad, Nizamabad and RangaReddy were covered under ATMA scheme and during the year 2006-07, the remaining (6) districts namely Medak, Mahabubnagar, Khammam, Karimnagar, Nalgonda and Warangal were covered resulting in coverage of entire state under the ATMA scheme.

OBJECTIVES OF THE PROGRAMME:

- To develop an efficient, effective, demand driven, research integrated and financially sustainable public extension system
- To revitalize the Agricultural technology Generation Assessment refinement and Dissemination Systems
- Reforming Public Sector Extension. Promoting private sector to effectively complement, supplement and wherever possible to substitute public extension.
- Augmenting Media and Information Technology Support for Extension.
- Mainstreaming Gender Concerns in Extension.
- Capacity Building/ Skill up-gradation of farmers and extension functionaries.
- Increase the Quality and Type of Technologies being disseminated by the Extension System.
- Strengthen Research-Extension-Farmer (R-E-F) Linkages

Benefits of the programme:

- Well Integrated technology development and transfer system
- Decentralized decision-making
- Financially sustainable extension system
- Bottom-up Planning
- Increased Use of Information Technology
- Emphasis on In-Service Training
- Developing New Public-Private Partnerships
- Strengthening Key Institutions
- Broad based Extension Delivery

Strategic Research and Extension Plan (SREP):

One of the first tasks of ATMA is to facilitation of the preparation of Strategic Research and Extension Plan (SREP) of the district. The SREP is prepared through participatory methodologies such as Participatory Rural Appraisal (PRA) involving all the stakeholders and farmers. The SREP contains detailed analysis of all the information on existing farming systems in the district and research extension gaps required to be filled-up. It also prioritizes the research – extension strategies within the district. It becomes the basis for development of work plans at blocks/ district level. All the (9) ATMA districts have developed their respective of Strategic Research and Extension Plans. As the validity of SREPs is five years, the State has already initiated the revisiting of the SREPs.

State Extension Work Plan (SEWP):

Based on the research-extension strategies given in the SREPs, Block / district level plans for the year 2015-16 has to be developed by all the (9) ATMA districts as per the revised ATMA scheme guidelines and cost norms. And State nodal Cell has consolidated District Action Plan developed under the Scheme should be processed consistent with Article 243 ZD of the Constitution.

Sub mission on Agricultural Mechanization: (SMAM)

Introduction

- Agricultural land area in the world has limit, but the demand for food is ever increasing due to population growth. To increase productivity in the limited land so as to meet the expanding demand arising from population growth as well as higher income is very important mission. (ii) The task assumes greater importance to India, than the rest of the world considering that India accounts for 2.4% of the world's geographical area and 4% of its water resources, but has to support17% of the world's human population and 15% of the livestock.
- To increase productivity, timely and precise field work is necessary. To make it possible, agricultural machines take an important role.
- Among the states, farm power availability in Punjab, Haryana, Western Uttar Pradesh and western part of Rajasthan is higher than the National average of 1.73kW/ha. In rest of the country, especially in Eastern and North-East Regions, it is significantly lower which necessities promotion of farm mechanization as a special Mission.
- Sub Mission on Agricultural Mechanization (SMAM) will be implemented in accordance with guidelines described hereunder.
- The scheme will be implemented in all the states, to promote the usage of farm mechanization and increase the

ratio of farm power to cultivable unit area up to 2 kW/ha.

- SMAM will have Central Sector Schemes under component No.1 & 2.Centrally Sponsor Schemes are covered under component No. 3 to8 in which Government of India contributes 75% and states contribute 25%.

Mission Objectives

- Increasing the reach of farm mechanization to small and marginal farmers and to the regions where availability of farm power is low;
- Promoting 'Custom Hiring Centres' to offset the adverse economies of scale arising due to small landholding and high cost of individual ownership;
- Creating hubs for hi-tech & high value farm equipments;
- Creating awareness among stakeholders through demonstration and capacity building activities;
- Ensuring performance testing and certification at designated testing centres located all over the country.
- Sub mission on Seed and Planting Material: (SMSP)
- The main objective of SMSP is to increase the production of Certified/Quality seed and making them to farmers.

SEED VILLAGE PROGRAMME:

- The Seed Village Programme ensures supply of quality seed of notified varieties to the farmers in time at their places at affordable prices besides ensuring quick multiplication of new seed varieties in a shorter time in that mandal /district based on the crop situation.
- The number of farmers for a unit of 10 ha may be a minimum of 25 to a maximum of 150. The following incentives will be provided to farmers under this scheme as per GOI norms.
- Supply of Foundation seed on 50% subsidy for cereals and 60% subsidy for Pulses and oilseeds.
- Trainings: Three (3) one day trainings (Pre-season, Mid-season and at harvest) will be conducted to the farmers on seed production technology.

NATIONAL MISSION FOR SUSTAINABLE AGRICULTURE: (NMSA)

The Government of India, Ministry of Agriculture has formulated National Mission for Sustainable Agriculture (NMSA) programme in the State of Telangana during 2014-15 for enhancing agriculture productivity especially in rainfed areas focusing on integrated farming. Water Use Efficiency, Soil Health Management and synergizing resource conservation technologies.

Mission Objectives:

- To make agriculture more productive, sustainable, and remunerative and climate resilent by promotion
- "Soil Health Management" Components of the scheme: Strengthening of existing Soil Testing Labs, Training & Demonstrations on Soil Health Management, Promotion and distribution of micronutrients, Strengthening of existing Fertilizer Quality Control Labs (FTLs) by State Govt, Setting up of new Fertilizer Quality Control Labs by State & Strengthening of existing BC Labs.

The main objectives of the scheme are:

- To facilitate and promote Integrated Nutrient Management (INM) through judicious use of chemical fertilizers, including secondary and micro

nutrients, in conjunction with organic manures and bio-fertilizers, for improving soil health and its productivity.
- To strengthen soil testing facilities and provide soil test based recommendations to farmers for improving soil fertility and economic return to farmers.
- To improve soil health through Sustainable Organic Farming.
- To facilitate and promote use of soil amendments for reclamation of alkaline soils for improving their fertility and crop productivity.
- To promote use of micro nutrients for improving efficiency of fertilizer use.
- To upgrade the skill and knowledge of technical personnel and farmers through training and exposure visits including demonstrations on farmers fields regarding conceptualization of Integrated Nutrient Management.
- To ensure quality control of fertilizers through strengthening of existing fertilizer quality control facility in FCO laboratories as well as Bio Pesticide Laboratories of the State for effective implementation of "Fertilizer Control Order".

Benefits of the programme:
- Judicious use of fertilizers based on Soil test results.
- Reduction in indiscriminate use of fertilizers results in reduced soil ill effects.
- Reduction in cost on fertilizers decreases the total cost of cultivation there by improves the profit margin to farmers.

"Soil Health Card" scheme:

The main components of the scheme is to issue Soil Health Cards, Demonstration and training on application of soil test based recommendations, Promotion of Nutrient Management Practices, and identify soil fertility related constraints and develop need based fertilizer management strategy.

The main objectives of the scheme are:
- To issue soil health cards to all farmers of the State, so as to provide a basis to include nutrient deficiencies in fertilization practices.
- To strengthen soil testing facilities and provide soil test based recommendations to farmers for improving soil fertility and economic return to farmers.
- To develop crops specific nutrient management in the districts for enhancing nutrient use efficiency.
- To facilitate and promote use of soil amendments for reclamation of alkaline soils for improving their fertility and crop productivity.
- To promote use of micro nutrients for improving efficiency of fertilizer use.

Rainfed Area Development (RAD):

Rainfed areas assume special significance in terms of ecology, agricultural productivity and livelihood for millions of rural households in India. These areas not only constitute about three fourth of the land mass under arid, semi-arid, and dry-humid zones. Rainfed agriculture is complex, diverse and risk-prone activity. However, Rainfed areas if managed properly have the potential to contribute a larger share in the food grain production. These high potential rainfed areas provide us with opportunities for faster agricultural growth compared to irrigated areas.

This will act as a catalyst to accomplish the ultimate objective of

enhanced productivity, minimizing the risk of crop losses due to uncertainties of weather conditions, harnessing efficiency of resources, assuring food and livelihood / income security at farm level and strengthen the farmers' capacity to adapt to climatic changes.

Objectives:

- To make agriculture more productive, sustainable, remunerative and climate resilient by promoting location specific Integrated/Composite Farming Systems.
- To conserve natural resources through appropriate soil and moisture conservation measures.
- To optimize utilization of water resources through efficient water management to expand coverage for achieving 'more crop per drop'.
- To develop capacity of farmers & stakeholders, in conjunction with other ongoing Missions e.g. National Mission on Agriculture Extension & Technology, National Food Security Mission, National Initiative for Climate Resilient Agriculture (NICRA) etc., in the domain of climate change adaptation and mitigation measures.
- To pilot models in select blocks for improving productivity of rainfed farming by mainstreaming rainfed technologies refined through NICRA and by leveraging resources from other schemes/Missions like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Integrated Watershed Management Programme (IWMP), RKVY etc.

ANDHRA PRADESH WATER SECTOR IMPROVEMENT PROJECT (APWSIP):

The Government of Andhra Pradesh is implementing Andhra Pradesh Water Sector Improvement. Project (APWSIP) for modernization of NagarjunaSagar project with the assistance of the World Bank at an outlay of Rs. 4444.41/- crores.

Duration of the project: 6 years commencement from September 2010 ending in July 31st 2016. The NSP feeds canals on the left and right banks of Krishna river through 116 mandals in the districts of Nalgonda (16), Khammam (16) under left canal in Telangana. The major area of crop is about 85% under Rice, Cotton, Chillies and pulses.

Project Development Objective:

- To improve irrigation service delivery on a sustainable basis so as to increase productivity of irrigated agriculture in the NSS
- To strengthen the state's institutional capacity for multi-sectoral planning, development and management of its resources
- The project aims to provide assured supply of water to Water User Associations (WUAs). The project also aims to provide farmers with necessary tools to maximize the productivity of water resource. The objective will be achieved through the provision of technical, extension and agri- business development support in such a way that it can be adapted to the farmers' needs at the community/WUA level in regards to agriculture, horticulture, production and fisheries.

The project supports the following components:

- Component A: Improving irrigation service delivery and management in Nagarjuna Sagar Project Scheme
- Component B: Irrigated Agriculture Intensification and Diversification

- Component C: Water Sector Institutional Restructuring and Capacity Building
- Component D: Project Management.

STATE AGRICULTURAL MANAGEMENT AND EXTENSION TRAINING INSTITUTE:

SAMETI registered under Societies Registration Act, 1860 has been functioning as an autonomous body from the year 2000 after up-gradation of Agricultural Staff Training Institute (ASTI). It is located at Old Malakpet, Hyderabad which is 6 km away from Hyderabad Railway station, 3 Km from Mahatma Gandhi Bus Station and 24.6 Km from Rajiv Gandhi International Airport

It was originally established in the year 1966 as Plant Protection Training Centre (PPTC), within the State Department of Agriculture for capacity building up of the Agricultural department extension functionaries in the innovative & new agricultural practices to meet the situations arising from large and frequent pest outbreaks. The field workers were educated & trained in monitoring and identifying different pests and diseases through symptom logical studies, microscopic examinations and other techniques to acquire skills in handling different types of application, machinery and to study different management practices to mitigate the situation. Hence, the institute was renamed as State Institute of Plant Protection and Pest Surveillance (SIPP & PS).

This institute was upgraded as an autonomous institute & registered under Societies Registration Act, 1860 from on 23.3.2000 & renamed as State Agricultural Management & Extension Training Institute (SAMETI) under National Agricultural Technology Project (NATP) as per G.O Ms. No. 62 dated 3.3.2000 of Agriculture & Cooperation (FP.II) Department, Govt. of AP, Hyderabad.

Aims and objectives of SAMETI

- To function as State Agricultural Management and Extension Training Institute at state level and to provide extension management input for extension functionaries of Agricultural and allied Departments
- To develop systematic linkages between the allied departments, state universities and regional and national institutes of outstanding accomplishments in the field of agriculture.
- To study the Agricultural Extension Management Systems and policies together with operational problems and constraints at all levels.
- To promote and develop the management tools for improving the effectiveness of Agricultural Extension Services through the mechanism of personnel management, resource management and input management.
- To organize need based trainings for senior, middle and grass root level functionaries for developing skills in executing extension programmes. This Institute is managed by the General and Executive Councils.

Mandate of SAMETI is to promote the extension and management tools for improving efficiency in extension services by capacity building of the extension functionaries working in Agriculture &allied departments like Horticulture, Veterinary & Sericulture.

VARIOUS LIVESTOCK PROGRAMMES INFRASTRUCTURE & VETERINARY SERVICES DEVELOPMENT:

Mobile Veterinary Clinics:

Under this programme all the departmental activities will be provided to the farmers at their doorstep. At present 15 Mobile Veterinary Clinics are functioning in remote tribal areas of the state. The staff of the Mobile Veterinary Clinic will exclusively visit the remote villages by giving schedule and also to attend emergencies services to the farmers besides regular work of treatment, AI services and vaccination programmes. During the year 2013-14, it is proposed to continue 15 Mobile Veterinary Clinics to provide services to remote tribal area livestock.

Upgrading Vaccine Production Unit/Standardization Unit / Disease Diagnostics:

Under this scheme the vaccine production units diagnostic and testing units will be strengthened with infrastructure and latest diagnostic equipment conforming to GMP and GLP standards. Under the programme Vaccine production units at Samarlakota/Hyderabad are proposed for strengthening during the year with an outlay of Rs.200.00 lakhs.

Infrastructure support to field Veterinary Institution (RIDF):

State Government have approved Rs.100 crores project under RIDF-XVIII for infrastructure development of 403 Vety. Institutions, 52 Animal Husbandry Divisional Level training centres, 4 Regional Level Training Centres and 1 State level Training Centres. The project will be completed in 3 three years. During the year the Government have allocated Rs.3804.15 lakhs for implementation of Phase –I works.

Artificial Insemination Centres:

Due to vast geographical area of the state, the department alone cannot provide breeding service facilities to the entire breedable livestock population. In order to improve the breeding operations in the uncovered areas of the state the department is establishing 500 Integrated Livestock development centres (ILD) with the assistance of JK Trust Gram Vikas Yojana. 291 ILD centres are functioning and 700 AI calves to be produced per centre. During the year 2013-14, it is proposed to allocate Rs.1000.00 Lakhs for functioning of ILD centres.

Buildings:

The Animal Husbandry Department has a large network of buildings in which different institutions are located all over the State. Most of the buildings are in dilapidated conditions. Many institutions do not have adequate space to store medicines, vaccines and fodder seed. These buildings need renovations for which an amount of Rs.65.00 lakhs is proposed during the year 2013-14 for construction of new buildings or renovation of buildings especially in Tribal areas.

FEED & FODDER DEVELOPMENT:

Under the programme improved fodder seed minikits on 75% subsidy basis will be supplied to small and marginal farmers and other weaker sections of the society. This will enable them to raise sufficient fodder for feeding their high productive livestock. During 2013-14 it is proposed to supply 10 kgs of fodder seed per beneficiary to cultivate at least 0.5 acre land to overcome fodder scarcity. To implement the programme it is proposed

to allocate Rs.788.60 lakhs during the year 2013-14.

LIVESTOCK DEVELOPMENT PROGRAMMES:

Distribution of Area Based Mineral Mixture:

The milch animals become infertile and un-productive due to mineral deficiency and the mineral deficiency is varies from one place to other place due to the type of soil and feeding habits of the region. The mineral deficiency will directly influence on the fertility of the animals and the animals become infertile and unproductive. The infertile animals are a burden on the farmers who sell it at a throwaway price. By identifying the area specific mineral deficiency and providing a suitable mineral mixture on free cost for a period of 90 days, the problem of infertility can be overcome.

It is proposed to conduct various trainings to the farmers on the need based subjects, especially focused on the clean milk production and also preparation of milk products and its marketing by involving the Regional Animal Husbandry Trg. centres, District Animal Husbandry Trg. Centres and existing publicity wings in the state. During the year 2013-14 an amount of Rs.5.28 lakhs proposed take up farmer's trainings and extension activity up to grass root level.

Extension & Training programme:

Fertility Camps:

Milch cattle belonging to all categories of farmers will be screened for their reproductive status through conduct of fertility camps and necessary remedial measures will be provided to make them fertile besides. Due to conducting of fertility camps, the farmers will cut down the feeding cost on unproductive animals. Further the farmers can plan to get a calf in year to get maximum calves per animal in her productive life. To implement the programme it is proposed to allocate Rs.982.09 Lakhs to conduct 10,000 camps.

Supply of Milch animals/Heifer units:

At present the Self-help groups at village level are taking up dairy activity successfully as one of the income generation activity. In some districts, they are also marketing the milk procured from the farmers at village level. If we support these Self-help groups/individuals with supply of high yielding milch animals/ Heifers on 50 % subsidy basis, this will further enable them to generate regular income apart from nutritional supplementation. Further in order to up bring the ST beneficiaries from BPL status they are provided with high yielding milch animals on subsidy basis.

Support to Gopalamitras

a. Performance based A.I. calf incentive:

There are about 970 SC Gopalamitras working in the state providing door step inseminations to the livestock of farmers. They are presently conducting about 4.0 lakh inseminations in a year. To encourage the SC Gopalamitras to perform more inseminations and bring more animals into productivity fold, it is proposed to provide Rs.50/- incentive per calf produced by a Gopalamitra. The estimated amount required to meet the expenditure for providing incentive for production of 1.00 lakhs calves is Rs.50.00 Lakhs per year.

b. Medical & Accidental Claim:

The Gopalamitras are working in rural areas covering about 8-10 villages every

day in his jurisdiction. They face a risk while travelling and also performing A.I. work by handling the animals. In order to provide a sense of security to their families, it is proposed to provide Group Insurance coverage to the SC Gopalamitras with a premium of Rs.2000/- per head towards mediclaim.

c.Mobility:

It is proposed to provide Rs.10,000/- towards interest subsidy or one time subsidy for providing vehicle (Two wheeler) to Gopalamitras for providing mobility to cover 8-10 villages in his jurisdiction so that the animals receive prompt A.I. or first aid to ailing animals within the scheduled time. It is proposed cover 970 SC Gopalamitras with an estimated cost of Rs.97.00 Lakhs.

Calf Rearing Programme:

Every year, a good number of high productive calves are being produced through Artificial Insemination. But due to financial constraints, farmers are unable to rear the female calves properly and convert them into productive livestock. Thus, we are not getting adequate replacement stock for the future. In the late 70's and early 80's, we had calf feed subsidy programmes under Special Livestock Breeding Programme (SLBP) in which calf feed was given on subsidy basis to the farmers who possess high productive female calves. This had given good impetus in creating milch animal replacement stock .During the year 2013-14, it is proposed to supply feed for 50000 calves with a total proposed cost of Rs.3170.00 Lakhs. The benefits accrued out of calf rearing programme will be in terms of the asset creation and future breeding stock for the SC families. The cost of asset created ranges between Rs.30,000/- to 50000/- basing on the production potential.

Sheep Development Scheme:

Deworming of Sheep and Goat:

Deworming of Sheep & Goat will improve growth rate and disease resistance in Sheep and Goat. The entire Sheep and Goat population (351 Lakh) in the state will be dewormed twice in a year on free of cost basis.During 2013-14 it is proposed to deworm 351 lakhs sheep and goat twice in a year with the proposed allocation of Rs.700.00 lakhs.

Assistance to Livestock Growers towards Insurance Premium

Sheep Insurance:

In order to provide necessary financial support to shepherds to overcome the sheep losses during disease outbreaks, the entire sheep population in the state will be insured. Government will provide subsidy towards insurance premium. The rest will be borne by the beneficiary.

Sheep and Goat rearing, Ram Lamb and Milch Goat Mini Units: (50% subsidy):

Sheep and Goat rearing:

In drought prone districts, sheep and goat rearing is taken up as one of the primary income generation activities. Sheep rearing is common in Telangana, Rayalaseema and South Coastal districts. It is proposed to distribute sheep and goat units (20+1) of recognized native breeds at unit cost of Rs.100000/- on 50 % subsidy.

The income generated out of the sheep and rearing units will be in terms of the following:

- the stock doubles within a span of one year
- 50% of the stock born will be males and can be disposed of after one year.

50% of stock (Females) will be future breeding stock.

- The total benefit out of sale of male stock will be Rs.20000/- in a year.
- The cost of breeding stock that would be available to the owner will be Rs.30000/- in one year.

Ram Lamb Rearing Units: (On 50% subsidy)

Though sheep rearing is one of the major income generation activities, the sheep rearers dispose of their ram lambs at very early age (4 months age) due to financial constraints. Had these lambs been reared upto one-year of age, it would have facilitated sheep growers to get additional income, besides contributing for additional meat yields.

In view of this, it is desirable to promote ram lamb rearing with adequate financial support. This activity will create employment generation to the rural youth and provides quick returns without much risk. The ram Lambs reared under this scheme can also be selected for replacement of breeding Rams. During the year 2013-14, it is proposed benefit 100 JLG groups (5 members group) on 50% subsidy with an estimated subsidy of Rs.80.00 lakhs. Each group will be provided with 50 ram lambs along with assistance for construction of shed, supply of concentrate feed for fattening and also health care to control mortality of lambs.

The benefits accrued out of ram lamb rearing will be the increased meat production due to rearing of the lambs till the age of at least of one year instead of selling at the usual 3-5 months of age and also the availability of breeding rams for the shepherds. The approximate income from the units will be double the unit cost of the ram lambs.

Milch Goats Mini Unit: (On 50% subsidy)

Milch goats will give about one liter milk and also give an average of 4 kids per annum thereby improving the nutritional and economic status of the beneficiaries. Goat is considered as **Poor Man's Cow** providing drought security to BPL families.

Under the programme, is proposed to provide 5 milch goats and one buck to each beneficiary and the allocation proposed for the year 2013-14 is Rs.45 lakhs to cover 360 beneficiaries with 50% subsidy. The income generated from the milch goat mini unit will be in terms of the income from the sale of male kids and nutritional security to the entire family. The female kids can be utilized as future breeding stock by the family. It is estimated that the income will be double the unit cost of the milch goat mini unit. Sheep & Goat Units, Ram lamb rearing units and Milch Goat mini units targets are interchangeable basing on the choice of the beneficiaries.

CENTRAL SECTOR/CENTRALLY SPONCERED PROGRAMMES:

The followings schemes were proposed continue under Central Sector Scheme and Rs. 810 lakhs proposed as Matching State Share and Rs.5520.40 Lakhs proposed as Central Share**.**

Professional efficiency development through Telangana State Veterinary Council, Hyderabad:

Veterinary Services & Veterinary Practice in the State will be regulated by registration of Veterinarians and publishing technical articles every month. The Telangana Veterinary Council has

proposed to impart refreshing training courses to in service candidates in addition to the primary mandate.

Integrated Sample Survey for estimation of production of Major Livestock products in the State:

Under this scheme, we have to collect the data on Major Livestock products like Milk, Meat Eggs and Wool production of the State to arrive at the contribution of Livestock Sector to GSDP. It is mandatory for all states to estimate these items.

ASCAD (Assistance to States for control of Animal Diseases):

The main objective of the scheme is to upgrade and strengthen the vaccine production facilities and also for purchase of vaccines to protect Livestock against economically important diseases. Apart from this, training of field staff is also covered under this programme. The programme is implemented with the assistance of GOI with 75% and 25% state matching state share.

Establishment and Strengthening of Veterinary hospitals and dispensaries:

The main objective of the scheme is to provide better animal health and enable livestock owners to realize full potential of their livestock and make optimum economic gains. The department has a large network of buildings in which different institutions are located all over the state. Most of the buildings are in dilapidated condition, many institutions do not have space to store medicines vaccines and fodder seed. The buildings which need establishment and strengthening of Veterinary hospitals and dispensaries. The assistance under the centrally sponsored scheme with75% central share and 25% state share for implementation.

Fodder and feed development – power driven chaff cutters:

At present there is wastage of 40% of dry fodder due to non-chaffing. To minimize the losses, the fodder should chaffed and fed to the animals. The assistance under the scheme will provided by 75% Central Government as one time grant out of the total cost of Rs. 5000/- per unit or 75% cost of the chaff cutter or whichever is less. The balance 25% share has to be met by the beneficiary.

Fodder and feed development – Azolla cultivation and production:

To encourage production of Azolla as an alternate source of green fodder, which is good source protein to replace costlier conventional protein rich concentrate in the livestock ration. The assistance under the scheme will be provided 50% by Central Government and 50% by states or implementing agency.

Fodder and feed development – fodder seed procurement and distribution:

To promote cultivation of superior variety of fodder for fodder seed (breeder, foundation and certified seed) production by creating assured market and distribution of seeds among the farmers. The assistance under the scheme will be provided 75% by Central Government and 25% share by states or implementing agency.

Fodder and feed development – Establishment of silage making unit:

The objective of the scheme is to establish silage making unit to preserve surplus fodder for feeding during lean periods. The salient feature of the scheme is during the period surplus supply of green fodder, farmers are to be

encouraged to take up silage making to make the quality fodder available during lean (shortage) period of fodder. 100% grant in aid by Central Government for establishment of silage making unit @ Rs. 1.05 lakhs.

Fodder and feed development – Grassland development including grass reserves:

The main objective of the scheme is the degraded grasslands will be slowly improved by introducing suitable grass, legumes and fodder trees (by silvipasteur etc). The extensive erosion presently taking place in the lands will be minimized and the biomass produced will help to minimize the gap between availability and requirement of fodder. The forage obtained from the lands will be utilized as reserves by establishing fodder banks and depots. The assistance under the scheme will be provided as 100% central assistance.

National Project on Rinderpest Eradication (NPRE):

The post vaccination sero monitoring and surveillance work is under way in the state. This is continued to declare the State free from Rinderpest disease that will help us increase our Livestock export.

19th Quinquinneal Livestock census:

The enumeration of 1.62 crore household wise livestock, farm equipment and fisheries census data of entire state is completed. After tabulation and compilation, a compendium of final data will be submitted to Government of India. This data will be useful for planning of various schemes suited to all categories of livestock farmers and also to provide effective livestock service delivery mechanism throughout the state.

Foot and Mouth disease control programme:

It is meant to protect the livestock against foot and mouth disease. It is being taken up in the state with two rounds of free vaccination in a year so as to make these districts as disease free zones. This will enable us to improve our livestock exports to other countries as per WTO guidelines.

NATIONAL CONTROL PROGRAMME ON BRUCELLOSIS (NCPB):

Brucellosis is an economically important disease of livestock, which is also zoonotic in nature. The disease is of zoonotic importance and mainly an occupational hazard i.e. Animal Husbandry staff, farmers, shepherds, milk and meat handlers but common public are also affected due to consumption of un-pasteurized infected milk and milk products.

The control of brucellosis can effectively done by elimination of infected animals in the villages and vaccination of female calves (4 – 8 months age) in highly infected herds. The objective of the programme is mass screening of livestock in all the villages and followed by vaccination of female calves (4 – 8 months of age) in all districts.

NATIONAL CONTROL PROGRAMME ON PESTE DES PETITS IN RUMINANTS (PPR):

Peste Des Petits Ruminants (PPR) is an acute, contagious viral disease of small ruminants. The Sheep and goat rearing in the state is in the hands of small and marginal farmers and landless labour. This disease causes severe economic losses to the sheep and goats rearing community, as the mortality and morbidity with this disease is very high. It

is very much essential to prevent and control the disease in the state. Apart from preventing losses to the sheep and goat farmers, the export potentiality of meat and meat products will also increase if PPR disease free zones are created. The control of PPR disease will help in prevention of economic losses to the farmers and also helps in export of meat and meat products to other countries.

Doubling Farmers' Income by 2022: Is It Attainable?

S. Niranjan[1*], G. Balaganesh[2] and A. Jamaludheen[3]

[1]*M.Sc. Scholar, Department of Agricultural Economics, College of Agriculture, Vijayapur, University of Agricultural Sciences, Dharwad, Karnataka.*
[2,3]*Ph.D. Scholar, Division of Dairy Economics, Statistics and Management (DESM), ICAR- National Dairy Research Institute (NDRI), Karnal, Haryana.*
**Corresponding Author:niranjansivalingam@gmail.com*

Abstract:
India is an agrarian country with nearly 70 per cent of the population living in rural areas, where 80 per cent of the people depend only on farming as their source of income. According to a survey conducted by NSSO in 2013, the average annual income of the farmers was about Rs. 6427, which was only Rs. 2115 in 2003. It should be noted that, among the total operational holding, nearly 90 per cent is under the small and marginal farmers who have less than 2 hectares of land. The study revealed that, it is possible for the farmers to double their nominal income in 6 years. However, it is practically difficult to double the real income of the farmers of all the classes in 6 years. So, farmers should concentrate on, reducing their input cost, diversifying their sources of income by doing allied agricultural activities and non-farm business activities. In addition, government should create proper marketing facilities for the farmers to increase producers' share in consumers' price.

Key Words: Doubling, Income, Diversification, Cost-reduction, Non-farm business.

Introduction:

The Hon'ble Union Finance Minister, Shri Arun Jately, while presenting Union Budget 2016–17, mentioned one of the objectives of government is to double the farmers' income by 2022. This announcement paved way for raising questions about the opportunities and challenges in doubling farmers' income by 2022. An occasional paper released by NITI Aayog identified five issues that need attention in order to improve the livelihood of farmer. The five issues are: increasing agricultural productivity, remunerative prices for farmers, focus on land leasing and land titles, risk adoption and mitigation and geographical focus on the eastern region. These issues need to be addressed to solve the symptoms of agrarian crises like rising input cost, dwindling market prices and lack of livelihood to the farmers, which paves the way for doubling farmers' income.

It is also important to look upon the sources of income and their share in total income to get an idea of investment of credit on productive assets. The strategies for doubling income should be multipronged and should address enhancing returns and reducing cost and making income sustainable keeping in view the depleting natural resource base. Challenges like proper implementation of development policies, constraints in adoption of new technology by farmers, risk mitigation by proper adoption of insurance, announcement of remunerative minimum support prices,

strengthening marketing channels which reduces price spread need to be over come in order to achieve the target of doubling farmers' income by 2022.

This paper focuses on,

1. Assessing the diversification of source of income in income growth.
2. Analyzing the trend in income growth on doubling time.

Methodology:

This study is mainly stressed on total annual income per agricultural holding, doubling time, share of different sources of income, net investment on productive assets, diversification index and number of operational holding. The data on these aspects were collected from NSSO Situation Assessment Survey in 59th and 70th rounds. The survey covered the years 2002-03 and 2012-13, respectively. Since the two surveys differ in the sample coverage these are not strictly comparable, but as there is no availability of other source of income, this available data is used for this study.

Doubling time was calculated by taking consideration of growth of income from 2002-03 to 2012-13. While calculating the share of different source of income in total income, the extent of diversification was calculated using Simpson's Index of Diversification with the formulae given,

$$\mathbf{D= 1-} \left[\frac{\sum n(n-1)}{N(N-1)}\right]$$

n = is the share of different source of income

N =is the total income

Value of zero for the index means there is no diversification in source of income, and value of one indicates total diversification. Cost incurred by different components is presented with pie chart.

RESULT AND DISCUSSION:

Table 1 depicts total annual income per agricultural holding and net investment on productive assets in 2002-03 and 2012-13. It is clear from the table that the income increases with increase in size of landholding and the total annual income has also increased between the years in all the classes. Furthermore, net investment on productive assets has also increased with increase in size of landholding in both the years (2002-03 and 2012-13). It is evident from the table that, the nominal income of the farmers could be doubled within 6 years, but the real income of the farmers could not be doubled within 6 years. Moreover, large farmers took lesser time to double their income while the small and marginal farmers needed more time for doubling their incomes.

Table 2 represents different sources of income and their share in total average monthly income. The major share in the total income is from cultivation, which accounts for about 46 per cent of the total income (Rs. 969) in 2002-03 and about 48 per cent (Rs. 3081) in 2012-13. Remarkably, landless households diversified their income sources by increasing the share of livestock significantly from 5 per cent to 26 per cent. Overall, the share of livestock in total share of income has been increased from about 4 per cent (Rs. 91) during 2002-03 to about 12 per cent (Rs. 763) during 2012-13.

Table 3 describes the number of households under different classes of size of landholdings and their major source of

income per 1000 population in 2013. Nearly 90 percent of the population comes under small and marginal farmers' category, whereas, only 0.4 percent of the households are large farmers. It is also clear from the table that, large farmers' major source of income is from cultivation of land. On the other hand, farmers in small, marginal and landless classes have diversified source of income. Number of household having livestock and earnings from wage/salary are comparatively more among small and marginal farmers than the large farmers. Overall, the number of households which have cultivation as their major source is income is higher with 635 households followed by wage/salary. However, households with agriculture and allied activities as their major source of income have registered a least number when compared with other sources of income.

The pie chart explains about the average expenses of farmers for cultivation. It is clear from the chart that, seeds (16%), fertilizers (23%) and labour (22%) accounts for more than 60 per cent of the input cost. Furthermore, pesticides and rent for the leased land accounted for 7 per cent and 5 per cent respectively. About 15 per cent of miscellaneous expenses were also recorded.

SUMMARY AND CONCLUSION:

Increasing farmers' income is one of the most important objectives of the Government of India and also a concern for developing the standard of people of the country as a whole. For a country like India, with a greater proportion of people being dependent on farming, structural transformation requires a huge period of time. Though doubling their income in 6 years is possible for a group of farmers with large size of landholding, it is highly impossible for a vast share of people to double their income. Unfortunately, about 90 per cent of the households possess very less operational landholdings in our country.

CHALLENGES

- Reduction in the average size of operational holdings
- Inability to adopt technologies due to lack of knowledge and skill
- Non-availability of institutional credit to the farmers when required
- Lack of knowledge about crop insurance schemes and marketing facilities
- Inability to mechanize the farms due to fractioning of farm land
- Increased input costs and over application of fertilizers and pesticides
- Lack of additional skills to diversify their source of income

RECOMMENDATIONS

Diversification of rural employment opportunities would have a possible impact on improving the small farmers' income. A household should be imparted with additional technical skills which would prevent them from depending on a single enterprise. Rural entrepreneurs should be encouraged by providing attractive subsidies and incentives as it creates additional employment besides increasing the income of the entrepreneur himself. Households with less landholding should invest more on productive assets like cattle, goats, sheep, machineries etc. which would a sustainable source of income unlike farming which is highly

uncertain. Thus, livestock can be key driver for income growth (Chandrashekar and melhotra). "A penny saved is penny gained", so, steps should be taken to reduce input costs which would definitely increase the income of the farmer. Machineries which are suitable for farmers with small land holdings like miniature tractors and power tillers at affordable cost could have a better impact.

REFERENCES

Satyasai, K. J. S., (2016), Farmers' Income: Trend and Strategies for Doubling, *Indian Journal of Agricultural Economics*, 71(3): ISSN 0019-5014. Pp: 397-405.

Mehta Rajiv, (2009), Rural Livelihood Diversification and its Measurement Issues: Focus India, *Wye City Group on Rural Statistics and Agricultural Household Income,* Second Meeting, 11-12 June 2009, FAO, Rome.

Government of India, (2005), Situation Assessment Survey of Farmers - Income, Expenditure and Productive Assets of Farmer Households, *NSS report 497 National Sample Survey Organization,* Ministry of Statistics and Program Implementation, New Delhi.

Shalendra and Jairath, M. S. (2016), National Agricultural Market: Present Status, Challenges and Way Forward, *Indian Journal of Agricultural Economics,*71(3): ISSN 0019-5014. Pp: 252-263.

Satyasai, K. J. S. and Sandhya Bharti, (2016), Doubling Farmers' Income: A Way Forward, *Rural Pulse*, Issue No. 14, March-April, NABARD, Mumbai.

Table 1: Total Annual Income, Net Investment on Productive Assets and Growth during Last Decade

	Total Annual Income (Rs.) Per Agricultural Holding		Net Investment on Productive Assets		Doubling Time	
	2002-03	2012-13	2002-03	2012-13	Nominal	Real
Landless (<0.01)	16560	54732	40	55	5.8	11.54
Lower Marginal (0.01-0.40)	19596	49824	37	251	7.43	21.54
Upper Marginal (0.41-1.00)	21708	62964	96	540	6.51	15.01
Small (1.01-2.00)	29916	88176	151	422	6.41	14.47
Semi-Medium (2.01-4.00)	43068	128760	387	746	6.33	14.03
Medium (4.01-10.00)	68172	235644	685	1975	5.59	10.7
Large (>10.00)	116004	496656	737	6987	4.77	7.92
All Sizes	25380	77112	124	513	6.24	13.56

Source: *Computed from NSSO (2005 and 2014); Farmers' Income: Trends and Strategies for Doubling, K. J. S. Satyasai (2016)*

Table 2: Average monthly income from wages, farm business and non- farm business per farmer household by size class of land possessed during the agricultural year 2002-03 and 2012-13

2002-03	Wages/ Salary	Cultivation	Livestock	Non-Farm Business	Total Income	Diversification Index
Landless (<0.01)	1075 (78)	11 (1)	64 (5)	230 (17)	1380 (100)	0.36
Lower Marginal (0.01-0.40)	973 (60)	296 (18)	94 (6)	270 (17)	1633 (100)	0.58
Upper Marginal (0.41-1.00)	720 (40)	784 (43)	112 (6)	193 (11)	1809 (100)	0.64
Small (1.01-2.00)	635 (25)	1578 (63)	102 (4)	178 (7)	2493 (100)	0.53
Semi-Medium (2.01-4.00)	637 (18)	2685 (75)	57 (2)	210 (6)	3589 (100)	0.41
Medium (4.01-10.00)	486 (9)	4676 (82)	12 (0)	507 (9)	5681 (100)	0.31
Large (>10.00)	557 (6)	8321 (86)	113 (1)	676 (7)	9667 (100)	0.25
All Sizes	819 (39)	969 (46)	91 (4)	236 (11)	2115 (100)	0.63
2012-13	**Wages/ Salary**	**Cultivation**	**Livestock**	**Non-Farm Business**	**Total Income**	**Diversification Index**
Landless (<0.01)	2902 (64)	30 (1)	1181 (26)	447 (10)	4560 (100)	0.52
Lower Marginal (0.01-0.40)	2386 (57)	687 (17)	621 (15)	459 (11)	4153 (100)	0.61
Upper Marginal (0.41-1.00)	2011 (38)	2145 (41)	629 (12)	462 (9)	5247 (100)	0.66
Small (1.01-2.00)	1728 (24)	4209 (57)	818 (11)	593 (8)	7348 (100)	0.60
Semi-Medium (2.01-4.00)	1657 (15)	7359 (69)	1161 (11)	554 (5)	10731 (100)	0.49
Medium (4.01-10.00)	2031 (10)	15243 (78)	1501 (8)	861 (4)	19636 (100)	0.38
Large (>10.00)	1311 (3)	35685 (86)	2622 (6)	1770 (4)	41388 (100)	0.25
All Sizes	2071 (32)	3081 (48)	763 (12)	512 (8)	6427 (100)	0.65

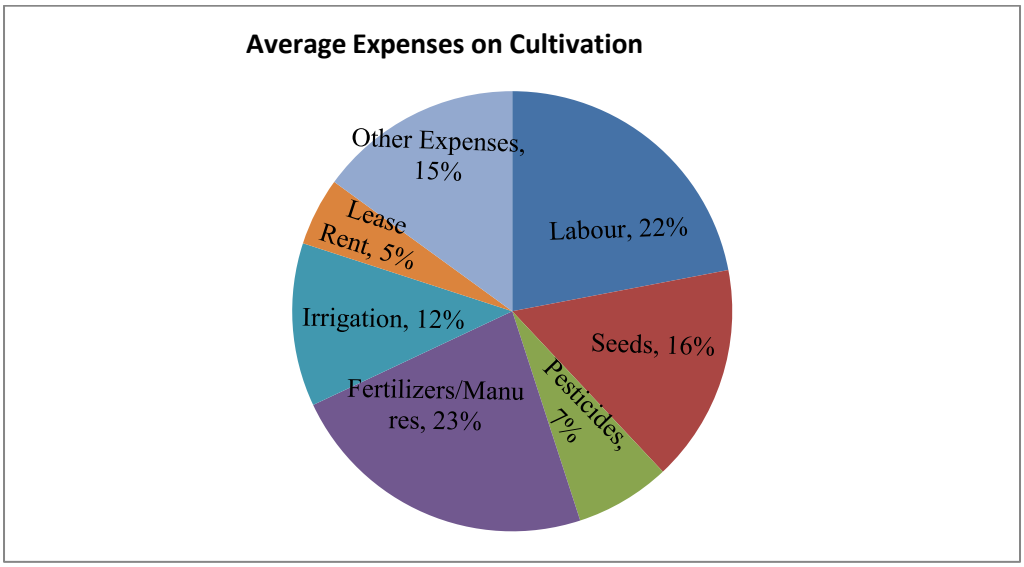
Source: *Computed from NSSO (2005 and 2014), Farmers' Income: Trends and Strategies for Doubling, K. J. S. Satyasai (2016)*

Table: 3 Per 1000 distribution of agricultural households by major source of income for each size class of land possessed at all India level

	Landless	Lower Marginal	Upper Marginal	Small	Semi-Medium	Medium	Large	All Sizes
Cultivation	16	421	692	830	859	879	894	635
Livestock	229	48	23	25	24	27	55	37
Allied activities	27	12	9	9	11	5	15	11
Other Enterprises	108	75	36	32	16	9	18	47
Wage/Salaried	564	352	200	86	71	59	17	220
Others	55	93	41	18	18	20	1	51
All	1000	1000	1000	1000	1000	1000	1000	1000
Estimated	23890	287663	314811	154577	84345	33019	3706	902011
% to all sizes	2.6	31.9	34.9	17.1	9.4	3.7	0.4	100

Source: *Computed from NSSO (2014),*

Chart 1: Expenses on cultivation in rural India



Source: *NSS Report No.497: Income, Expenditure and Productive Assets of Farmer Households*

Diagnosis of cryptosporidiosis in animals

Krutanjali Swain[1*], Sukhdeep Vohra[1], Snehil Gupta[1], Abhilash Routray [2], Sumitra Panigrahi [2] and Adya Prakash Rath[3]

[1]M.V.Sc Scholar, [1]Asst. Professor, Department of Veterinary Parasitology, [2] M.V.Sc Scholar, Department of Veterinary Public Health and Epidemiology, [3] M.V.Sc Scholar, Department of Veterinary Pathology. Lala Lajpat Rai University of Veterinary and Animal Science, Hisar, Haryana, India.*

Cryptosporidiosis is caused by a small apicomplexan protozoan parasite belonging to genus *Cryptosporidium* which is responsible for entero-colitis and long lasting debilitating diarrheal disease in man as well as animals. The disease condition is self-limiting in immuno-competent individuals but often life threatening to the immuno-compromised patients. Generally, young animals below one month of age are more susceptible. *Cryptosporidium* is a zoonotic parasite which inhabits the intestinal and respiratory surface epithelium of 152 species of mammals including humans, birds, reptiles, amphibians and fish.

Cattle and buffaloes are the most important animal groups which are predominantly recognized to be infected with *Cryptosporidium*. There are currently 19 species and 40 genotypes of *Cryptosporidium*.Calf diarrhoea associated with *Cryptosporidium* was for the first time reported by Nooruddin and Sarma (1987) in India and the first confirmed case of *C. parvum* in calves was reported in Uttar Pradesh (Dubey *et al.*, 1992).

CLINICAL CHARACTERISTICS

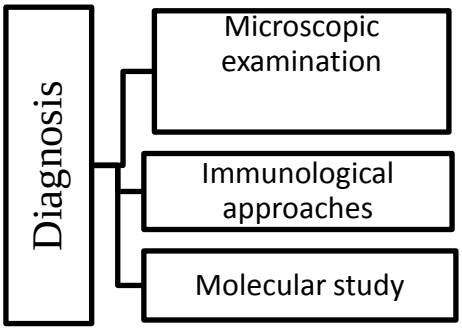
- Incubation period,4 days in calves
- Watery cholera-like Diarrhea. In most cases, the diarrhea is self-limiting after several days. Varying degrees of apathy, anorexia, and dehydration are present
- Malabsorption and Malnutrition due to concurrent loss of surface microvilli
- Watery eyes, sneezing, coughing and respiratory distress in chickens
- More severe disease can occur with concurrent infections.
- Animals can also be colonized without symptoms

LESIONS

Calves with persistent diarrhea have villous atrophy in the small intestine. Histologically, large numbers of the parasite are embedded in the microvilli of the absorptive enterocytes. In low-grade infections, only a few parasites are present, with no apparent histologic changes in the intestine. The villi are shorter than normal, with crypt hyperplasia and a mixed inflammatory cell infiltrate.

Diagnosis of cryptosporidiosis

Diagnosis is based on detection of oocysts by examination of fecal smears with Ziehl-Neelsen stains, fecal flotation techniques, ELISA, fluorescent-labeled antibodies, a rapid immunochromatographic test, and PCR. Sheather's flotation sedimentation staining is the most sensitive (83%) and specific (99%) of these techniques, with a relatively low cost per test. Diagnosis is generally by means of detection of oocysts in faeces, and occasionally in other specimens, methods are described in detail below



MICROSCOPIC EXAMINATION

(1)Wet Mount

Cryptosporidium spp. oocysts are rounded and measure 4.2 to 5.4 µm in diameter. Sporozoites are sometimes visible inside the oocysts, indicating that sporulation has occurred .They do not autofluoresce.

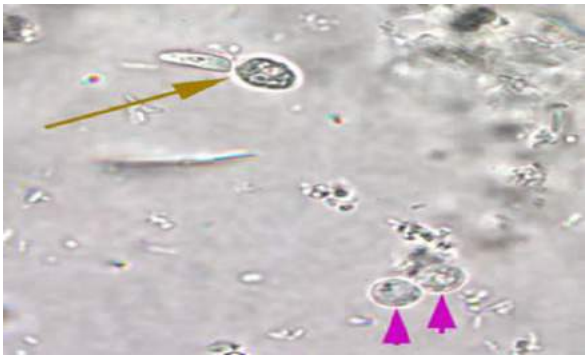


Figure 2:Cryptosporidium oocysts in wet mount

(2)Modified Acid fast stain

Oocysts (4 to 6 µm) often have distinct oocyst walls and stain from light pink to bright red. However, staining may be variable. In particular, infections that are resolving can have colorless oocyst "ghosts." Mature oocysts may have discernible sporozoites (up to 4).

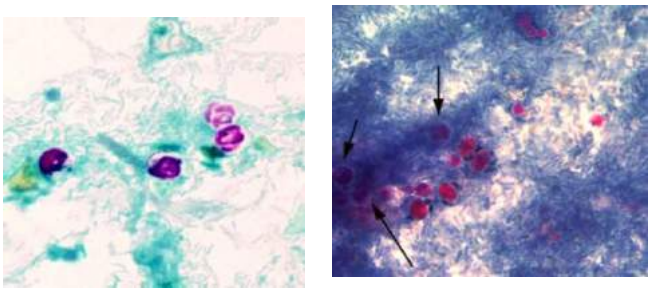


Figure 1: Cryptosporidium oocysts look light pink to dark red in MZN staining in oil immersion

(3)Auramine-phenol staining

- Oocysts appear ring or ovoid shaped .
- They Exhibit bright apple-green fluorescence against a dark background using an fluorescence microscope equipped with FITC filters.

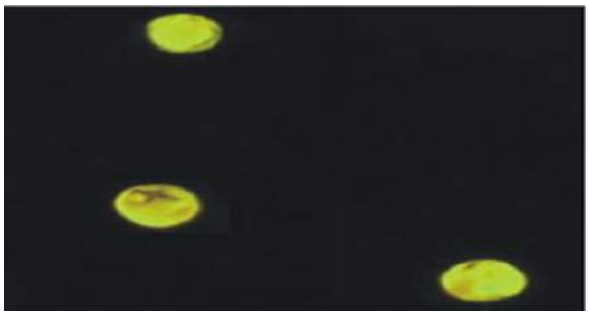


Figure 3:Cryptosporidium oocysts appear bright apple green in auramine phenol staining

(4) Methods for detection (but not confirmation) of *Cryptosporidium*

Oocysts may be detected by the following methods, but should not be confirmed by the diagnostic techniques listed above**.**

- **Safranin stain**
- Oocysts of Cryptosporidium often (but not always) stain a bright reddish-orange colour.
- This method advocated for Cyclospora, is not widely used for

Cryptosporidium because the Cryptosporidium oocysts may not always properly stain.

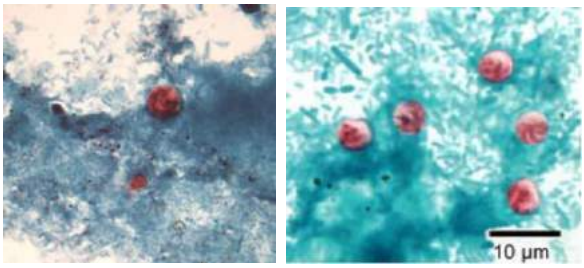


Figure 4: Bright reddish orange colour Cryptosporidium oocysts in safranin staining

❖ **Trichrome staining**

- Oocysts may be detected, but should not be confirmed, by this method.
- This staining method is inadequate for definitive diagnosis
- Because all oocysts will appear unstained. Oocysts appear as small round structures measuring 4 to 6 µm.

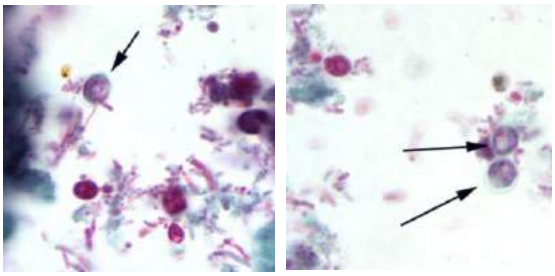


Figure 6: Blue/puple colour Cryptosporidium oocysts in trichrome staining

IMMUNOLOGICAL APPROACHES

(1)Enzyme –Linked Immunosorbant Assay (ELISA)

- Detect isolated antigens from a sample using Ab that are tagged with a colour changing enzyme
- Relatively high sensitivity and specificity
- ELISA is time saving device, less expensive, screens large no of samples within a hours and most importantly the lack of radiation hazards as the radioisotopes are not used.

Figure 7: : Well showing colour changes at buttom that indicates positive sample

(2) Rapid immunochromatographic cartridge assays

- Detect isolated antigens from sample using antibodies.
- A positive test is indicated by a coloured bar on membrane
- Variable Quick and easy to perform
- sensitivity and specificity

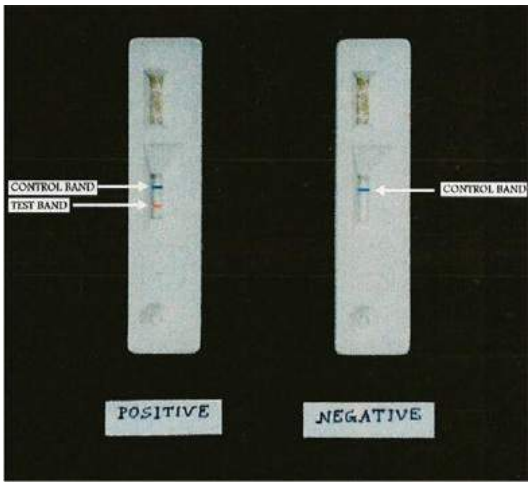


Figure 5: Red colour bar showing positive Cryptosporidium in rapid immunochromatographic cartridge assays

(3) Fluoroscent Antibody Technique (Immunofluorescence)

This technique is often used to identify unknown antigen. The technique is based on the behaviour of certain dyes which fluoresce (glow) when exposed to certain wavelength of light. Such dyes are: fluorescenin isothiocyanate which emits

an apple green glow and rhodamine isothiocyanate which emits orange red light

- Highest combination of sensitivity and specificity
- Gold standard by many lab
- It requires special equipment (fluorescence microscope) and commercially available test kits.

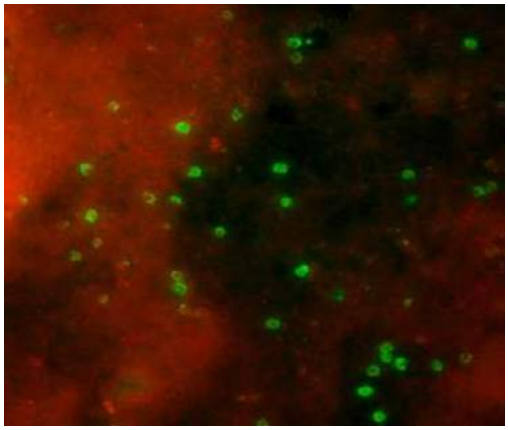


Figure 8: Cryptosporidium oocysts appear fluoroscent green in dark background in FAT assay

MOLECULAR METHOD

(1) PCR Analysis

- Genomic DNA extraction
- Specific gene will be amplified using appropriate set of primers
- PCR product confirmed by AGE
- High sensitivity and specificity
- Different types of PCR like Real time PCR, Nested PCR, Droplet digital PCR, Multiplex PCR etc are used for more confirmation
- PCR-RFLP technique
- DNA sequencing and Phylogenetic analysis

(2) 2.4.2. Fluorescence In Situ Hybridization (FISH).

This method relies on the hybridization of synthetic oligonucleotide probes to specific regions within the rRNA of the organism.This assay is based on species-

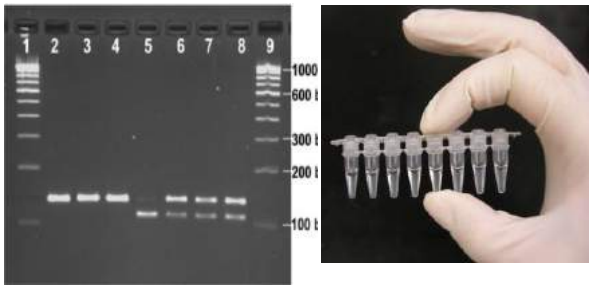


Figure 9: DNA extreaction in PCR tube and bands in AGE showing Cryptosporidium positive sample

specific probes for *C. parvum* and *C. hominis*. FISH can detect and identify pathogenic *Cryptosporidium* species in clinical, water, and environmental samples within a 3-h time frame. So, it is a reliable alternative to PCR and RFLP. It can distinguish between the two major species involved in human infections.

(3) Loop Mediated Isothermal Amplification (LAMP)

It is a unique amplification method with extremely high specificity and sensitivity able to discriminate between a single nucleotide difference. It is characterised by the use of six different primers specifically designed to recognise eight distinct regions on a target gene, with amplification only occurring if all primers bind and form a product.

CONCLUSION

Diagnosis is made conventionally by microscopy after staining feacal smears with Modified Ziehl-Neelsen or Auromine Phenol methods for detection of round, sporulated oocysts of 4 to 5 µm in size. Kinyoun's and DFAT are the reliable screening tools for cattle samples, DFAT and PCR analysis (targeted at the 18S rRNA gene fragment) were more sensitive for screening sheep and horse samples. Therefore, for identification of

Cryptosporidium spp. in the event of asymptomatic cryptosporidiosis, the combination of different 18S rRNA nested PCR primer sets is recommended for further epidemiological applications and also tracking the sources of infection. (Ezzaty *et al*). In India, this technique has been widely in use for diagnosis of cryptosporidiosis in animals. The immunological approaches like direct immunofluorescence, enzyme linked immunosorbent assay and immunochromatography for the detection of *Cryptosporidium* oocysts are useful but inherit the limitation of species identification. The polymerase chain reaction has revolutionized the field of diagnosis in parasitology.

Therefore, molecular characterization has been widely used to characterize the genetic structure and speciation of *Cryptosporidium* and for the assessment of their zoonotic potential . PCR is more sensitive than conventional and immunological assays for detecting oocysts in faeces because

- It is More sensitive
- Ease to use
- Ability to analyse large numbers of samples at one time.
- Relatively low cost
- Ability to speciate (thus eliminating false positives encountered with cross reactions of antibodies to non-pathogenic protozoan species).
- Strain typing potential (thus allowing the source of infection to be determined).

REFERENCES

Bhat, S.A., Juyal, P.D and Singla L.D. (2013). Distribution of bovine cryptosporidiosis in India. *Trends in parasitology research*. **2**(2). ISSN:2319-314X

Bhatia, B.B., Pathak, K.M.L and Banerjee, D.P (2007). A text book of veterinary parasitology, Kalyani publication.

Dubey, J.P., Fayer, R. and Rao, J.R. (1992). Cryptosporidial oocysts in faeces of water buffalo and zebu calves in India. *J. Vet. Parasitol*. **6**: 55-56.

Ezzaty, M. M, Zintl, A, Grant ,T, Luc,y F.E, Mulcahy, G and De, W. T (2015) Comparison of diagnostic techniques for the detection of *Cryptosporidium* oocysts in animal samples. *Exp Parasitol*

Fayer, R. and Xiao, L. (2008*). Cryptosporidium* and cryptosporidiosis, 2nd Edn. CRC press, Boca Raton, UK. Pp 560.

Laboratory diagnosis of cryptosporidiosis,CDC

Nooruddin ,M. and Sarma, D.K. (1987). Role of *Cryptosporidium* in calf diarrhoea. *Livestock Advisor*: **12**: 49–51.

OIE Terrestrial Manual (2008). Cryptosporidiosis, Chapter 2.9.4

Overview of cryptosporidiosis: Merck veterinary manual

Shobhamani, B., Singari, N.A. and Syamasundar ,N. (2006). A study on clinical manifestations of cryptosporidiosis in calves. Indian Vet. J. 83: 677-678.

Xiao, L. (2010). Molecular epidemiology of cryptosporidiosis: an update. Exp. Parasitol. 124: 80–89.

Effect of Climate Change on Food Security vis-à-vis Plant Diseases

Sajad Un Nabi, Wasim H Raja, Kishan Lal Kumawat and Desh Beer Singh

ICAR-CITH Old Airfield Rangreth Srinagar, 191132, J&K, India
Corresponding Author: sajadnabi21@gmail.com

Abstract

Climate change is the biggest threat to mankind, affecting agriculture due to 0.74°C average global increase in temperature in the last 100 years and atmospheric CO_2 concentration rise from 280 ppm in 1750 to 400 ppm in 2014-15. Such changes pose a drastic influence on the growth and cultivation of the different crops on the Earth as global food production must increase by 50% to meet the projected demand of the world's population by 2050. Simultaneously, these changes will also affect the reproduction, spread and severity of many plant pathogens, thus posing a threat to our food security. Pest and disease management has played its role in doubling food production in the last 40 years, but pathogens still claim 10–16% of the global harvest. Integrated solutions and international co-ordination in disease management strategies should be reoriented under changing climatic conditions with amalgamation of new strategies for sustainable food production and food security.

INTRODUCTION

The earth's climate has always changed in response to changes in the cryosphere, hydrosphere, biosphere and other atmospheric and interacting factors. It is widely accepted that human activities are now increasingly influencing changes in global climate every year. Since 1750, global emissions of radioactively active gases, including CO_2 have increased rapidly, a trend that is likely to accelerate if increase in global emissions cannot be curbed effectively. Defining uncertainty is important in all areas of climate change research, not only in assumptions for stochastic or deterministic models, but also in biological processes where knowledge or understanding is lacking. However, uncertainties are arguably greater when the implications of climate change on food security are considered. Food security can be defined as "when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 2003). It is a combination of multiple food availability, food access and food utilization issues. Each of these is influenced by many factors, such as economic recession, currency fluctuations, water pollution, political unrest, war, trade agreements and climate change, compounding the uncertainties in each. The FAO estimated that 1.02 billion people went hungry in 2009, the highest ever level of world hunger, mainly because of declining investment in agriculture. It has been estimated that land degradation, urban expansion and conversion of crops and croplands for non-food production will reduce the total global cropping area by

8–20% by 2050. Furthermore, food has social values inseparable from the production, distribution and use value chain. All these factors may be affected by climate change, and some are affected both directly and indirectly through pest and pathogen-mediated changes that occur because of climate change.

To understand, how best to control plant diseases to improve food security in the context of climate change, plant protection professionals must work with societal change, defining its key processes and influencers to effect change. More specifically, there is a key role to play in improving food security. Pests and diseases could potentially deprive humanity up to more than 50 % of the attainable yield in major crops, combined with postharvest spoilage and deterioration in quality, these losses become critical, especially for resource-poor regions. Nevertheless, grain production has doubled over the last 40 years, because of changes in plant protection and other agricultural technology, including a 15–20-fold increase in pesticide use worldwide. Despite this, the overall proportion of crop losses has increased during this period and excessive use of pesticides has increased pest outbreaks and losses in some crops and areas. As world agriculture responds to challenges of securing sufficient, safe and nutritious food for the ever-expanding human population under changing climate, no doubt pesticide usage will increase even more. Identifying key constraints to food security, primarily from a production perspective, we need to think, how best we can improve plant disease management strategies which can enhance global food security.

EFFECTS OF CHANGE IN DIFFERENT PARAMETERS

Effect of elevated concentrations of CO_2 has been evaluated with respect to important diseases of rice, viz., blast (*Pyricularia oryzae*) and sheath blight (*Rhizoctonia solani*), diseases of soybean *Peronospora manshurica*), brown spots (*Septoria glycines*), plants were found more susceptible to injury. Changes in temperature and precipitation regimes due to climate change alter the growth stage, development rate and pathogenicity of infectious agents, physiology and resistance of the host plant. There are indications of increased aggressiveness at higher temperatures of stripe rust isolates (*Puccinia striiformis*), suggesting that rust fungi can adapt to and benefit from higher temperatures. Diseases such as common bunt (*Tilletia caries*) and Karnal bunt (*Tilletia indica*) in wheat can be of importance under changing climatic conditions in regions with low productivity if proper seed treatment is not followed in this crop. In India, in the last decade the disease scenario of chickpea and pigeon pea has changed drastically; dry root rot (*Rhizoctonia bataticola*) of chickpea and *Phytophthora* blight (*Phytophthora drechsleri* f. sp. *cajani*) of pigeon pea have emerged as a potential threat to the production of these pulses. Moisture can impact both host plants and pathogens in various ways. Some pathogens such as apple scab, late blight and several vegetable root pathogens are more likely to infect plants with increased moisture content because forecast models for these

diseases are based on leaf wetness, relative humidity and precipitation measurements.

MITIGATION STRATEGIES

Crop protection could be considered as an integrated approach since pesticides are directly applied only when there is a perceived or actual threat. However, such applications of conventional crop protection products often disrupt many processes keeping such organisms in some sort of benign balance in non-epidemic situations. These factors or processes can be categorized in terms of risk mitigation and risk enhancement. These rates determine, the processes are result of complex interactions between these 'remediating' and 'enhancing' influences. Traits needed by plants to adapt to pathogen threats following climate change generally come in the categories of resilience and durable resistance. In monocultures, the use of major genes for resistance to pathogens is likely to lead to strong selection on pathogen populations to overcome them, whereas in heterogeneous communities it may lead to stability. Therefore, strategies for establishing greater resilience in agricultural crops should introduce more genetic variability, both within and between cultivars, thereby mimicking the broader genetic basis of resistance to both abiotic and biotic stresses found in such communities. However, focus should be on breeding for and managing 'ecological tolerance', since managing levels of pathogens that cause little yield loss is likely to be a far more robust control strategy than trying to eliminate all pathogens. Since many pests and pathogens are opportunists that occupy any trophic niche not adequately protected by a resistance mechanism or crop protection measures. By comparison, deployment of a major gene for resistance effective under a range of environmental conditions delivers high efficacy for a narrow target disease control with limited duration and high vulnerability. Enhanced efficacy can be delivered through incorporating heterogeneity into both the crop and risk mitigation processes, effectively spreading risk, albeit at the expense of maximum gain from implementation of less durable options, such as deployment of resistant cultivars in extensive monoculture or extensive use of a single fungicide. However, if the challenge of increasing food production by 50% by 2050 can be met only by deploying cultivars with single or multiple resistance genes or by use of fungicides, it will be difficult to argue for an alternative approach that may not produce the highest attainable yields.

Development and use of disease-resistant varieties offers economic, health and ecological benefits, as demonstrated using Bt-cotton in many countries, including, where the use of pesticides is a major concern. Examples of extreme weather events such as hurricanes causing the spread of plant pathogens to new areas are common and are expected to increase with the projected increase in the frequency of extreme weather events under climate change. In addition to loss in production, this can restrict market access, limiting valuable export earnings for some developing countries. The need for a co-ordinated surveillance system complemented by robust diagnostic networks and widely accessible

information systems has never been greater. But the cost of effective surveillance can be high for many developing countries.

FUTURE PROSPECTS & CONCLUSION

If food production has to increase by 50% in the next 40 years from a shrinking land resource, this will require a sustained and huge investment of capital, time and effort. In common with the past triumphs of world agriculture that gave us the green revolution to save millions from starvation, a major component of the solution will have to come from improved technology. This technology will need to produce, process, distribute and market food that is sufficient, safe and nutritious to meet the dietary needs and preferences of the world human population, without affecting the sustainability of the natural environment. There has been only limited research on impact of climate change on plant diseases under field conditions or disease management under climate change. However, some assessments are now available for a few countries, regions, crops and pathogens which concern with food security. Now, emphasis must shift from impact assessment to developing adaptation and mitigation strategies and options. First, there is need to evaluate under climate change the efficacy of current physical, chemical and biological control tactics, including disease-resistant cultivars, and secondly, to include future climate scenarios in all research aimed at developing new tools and tactics. Disease risk analyses based on host–pathogen interactions should be performed, and research on host response and adaptation should be conducted to understand how an imminent change in the climate could affect plant diseases. If the goal of retaining an increasing amount of the attainable yield and quality is to be achieved, communication of research must extend beyond the farm gate to promote increased awareness among policy makers and the society at large. In the first instance, research outputs can be made more policy friendly with a 'clear take home message'.

REFERENCES

Anderson PK, Cunningham AA, Patel NG, Morales FJ, Epstein PR, Daszak P, 2004. Emerging infectious diseases of plants: pathogen pollution, climate change and agrotechnology drivers. *Trends in Ecology & Evolution* 19, 535–44

Flood J, 2010. The importance of plant health to food security. *Food Security* 2, 215–31.

Pangga IB, Hannan J, Chakraborty S, 2011. Pathogen dynamics in a crop canopy and their evolution under changing climate. *Plant Pathology* 60, 70–81.

Spray drying and its application in dairy industry

Rashmi Bhardwaj[1], Diwakar Mishra[1] and Simran Arora[2]

[1]Dairy Technology Division, ICAR- National Dairy Research Institute, Karnal, Haryana.
[2] Centre of food science and technology, CCSHAU, Hisar, Haryana.

Spray drying is the most common industrial powder manufacturing technology. It consists of atomizing a liquid, solution, emulsion or suspension into a hot gas medium to dry and transform it into particles in a one step operation. It have been used by the dairy industry since the late 1850s, this technology attends now different sectors, extending from the food industry to the agrochemical, biotechnology, heavy and fine chemicals, mining and metallurgical, dying, pharmaceutical sectors among others. Spray drying is a special process of drying which is used to transform the feed from a liquid state into a dried particulate form (Powder or Particles) by spraying the feed into a hot drying medium. Spray drying turn out a greater tonnage of dehydrated food products than all other kinds of drying techniques. There are various types of spray driers designed for specific food products. Spray drying is limited to foods that can be atomised, such as liquids and low viscosity pastes and purees atomization into minute droplets result in drying in a matter of seconds with common inlet air temperatures of about 200^{0}C. Since evaporative cooling seldom permits particles to get warmer than about 80^{0}C and properly designed systems quickly remove the dried particles from heated zones, this method of dehydration can produce exceptionally high quality with many heat sensitive materials, including milk, eggs and coffee.

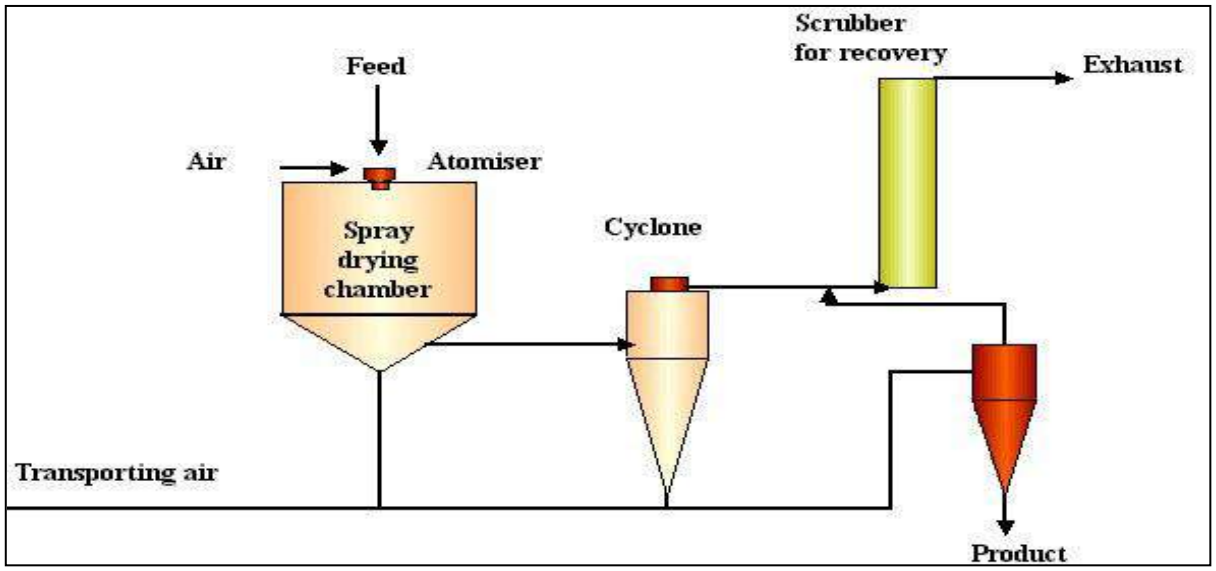


Figure1:- Schematic representation of spray drier

STAGES IN SPRAY DRYING:-

A conventional spray drying process consists of the following three stages:

- Atomization of feed into droplets
- Spray-air and heating medium contact and drying of droplets
- Product recovery and final air treatment

1. Atomisation of feed into droplets: - The feed liquid, which can be a solution, suspension or an emulsion, is pumped to an atomizer located in the air disperser at the top of the drying chamber. The atomizer sprays the liquid into a high velocity stream. Atomisers are of two main types: pressure spray nozzels and centrifugal spinning disks, or baskets. Spinning discs and baskets, from which deposited food throws out droplets, are favoured where passage through a fine hole pressure-nozzle can damage the food, as might be the case in denaturing protein, egg white. Viscous liquids and purees with fine pulp also may not be able to pass through a fine pressure nozzle but can be easily spun from a high-speed, rotating disk.

2. Spray-air and heating medium contact and drying of droplets:- The atomised droplets produced by the atomiser come in contact with the drying air and the resulting spray droplets are dried as they are carried downwards in the central air jet towards the integrated fluid bed. Particles enter the fluid bed while the air flow reverses upwards to be exhausted from the top of the drying chamber.

3. Product recovery and final air treatment: - The finer particles separated from the exhaust air are recycled to the drying chamber. The fluidization of particles in the fluid bed, fines recycle and particle movement in the air flow result in spray drying taking place in a powder-laden atmosphere which is much denser than in conventional drying systems. Particles of higher moisture content can then be handled as the resulting powdering effect overcomes problems of surface stickiness of the drying particles. The moisture content of particles entering the fluid bed can be controlled to the level required for achieving the desired particle size increase and structural change (agglomerating or granulating). When required, final drying and cooling of the product takes place in a fluid bed connected to the outlet of the integrated fluid bed.

SPRAY DRYING OF MILK AND MILK PRODUCTS

Milk

Fresh milk has a high nutritional value; however this product has a limited shelf-life and therefore should be processed in order to become microbiologically stable. Spray drying of milk is a very important process in the dairy industries. The disadvantage of milk drying is that the energy consumption is high; no other process in the dairy industry demands a high energy per ton of final product. This fact occurs due to high moisture content of milk (about 90%), and practically all that water has to be removed by heat. The advantage of spray drying is a relatively gentle drying process that has replaced drum dryers, which causes more product denaturing. The quality of milk powder is an important parameter to be considered, that will determine the acceptance of product in the market. These aspects are

related to the: microbiological safety, chemical quality and physical-chemical properties (moisture and fat content, bulk density, particles size) of the powder. The physical-chemical properties are important, because they affect the powder reconstitution (sinkability, solubility, dispersability and wetability) in water.

Whey

In terms of volume and weight, whey is the largest amount of waste from the cheese industrial processing, becoming a problem, both for environment and processing plant. Therefore, the cheese industry is continuously looking for solutions to these problems caused by whey discharge, such as animal feeding and fertilizer. Therefore, it has been necessary to find alternative types of products made from whey that would be more attractive for consumers, together with alternative low-cost technologies that would be more attractive for producers. Spray drying of whey can be a solution for cheese industry, since the product has high protein content. There are two major whey proteins: alpha-lactalbumin and beta-lactoglobulin, which plays an extremely important role in the food industry, as a result of its gelation and emulsification properties.

Cheese

In almost every cheese factory, spray drying is an important process. However, spray dryers are mostly used for the by-product drying, such as whey, while is little used for making cheese powder. Cheese powder is mainly utilized as flavouring in dips, dressings, biscuits, chips and hot dishes, like spaghetti and soups. Before spray drying, it is necessary converting cheese to pump able fluid and not too viscous for atomization. This step is done by melting process, where the cheese is disintegrated and, during heating and agitation, melting salts such as phosphates and citrates are added together with water. For spray drying of cheese, aged cheese is recommended as a feed material, since a certain quantity of aroma is inevitably lost during process.

CONCLUSION

Spray drying, both conventional and innovative, will continue to find increasing applications in various industries. Some of the common features of innovations are identified. There is need for further R&D and evaluation of new concepts. Dairy industry can very well utilize the spray drying to retain the nutritional quality of milk and milk products. Spray drying is an important operation for industries that deserves multi-disciplinary R&D preferably with close industry academia interaction.

Cystic Ovarian Degeneration In Cattle

M. Rajashri* and L.Vennela

College of Veterinary science, PVNRTVU, Rajendranagar, Hyderabad-500030
**Corresponding author: rsri0835@gmail.com*

Cystic follicles are one of the most common causes of reproductive failure in cattle. This condition can result in significant economic losses to the dairy industry because of both increased calving to conception and calving intervals. The incidence of ovarian follicular cysts in dairy cattle has been reported to be from 5.6 to 18.8%. This estimate may be higher because of the fact that 60% of cows that develop cystic ovarian degeneration (COD) before the first postpartum ovulation recover spontaneously and may go undetected. In addition, cows affected may be at greater risk of being culled because of poor reproductive performance. It is most common in milking dairy cows. However, it has also been diagnosed in heifers, dry cows and beef cows. Ovarian follicular growth occurs in two or three (in rare cases four) waves during the normal bovine oestrous cycle. Each wave is preceded by a transient increase in FSH. The wave is characterized by recruitment of two to six follicles, 4–5 mm in size, followed by selection of one follicle that grows to become a dominant follicle by yet an unknown mechanism while the others undergo atresia and regression. In 10–15% of cases, this dominant follicle fails to ovulate and continues to grow into a cystic follicle. A cystic follicle is defined as an anovulatory follicle-like structure (greater than 2 cm in diameter) that may persist on the ovary (usually for more than 10 days) with or without the presence of a corpus luteum. The size may be lesser than 2 cm in certain cases.

PATHOGENESIS

Hypothalamo-hypophyseal dysfunction

- The most widely accepted hypothesis involves a neuroendocrinological dysfunction of the hypothalamic-pituitary- gonadal axis.
- As per this hypothesis, the primary cause is a deficiency in the pre-ovulatory surge like release of LH, or an aberrant release pattern of this hormone.
- Pre-ovulatory follicles secrete oestrogens that cause positive feedback on the hypothalamo-hypophyseal axis to release LH responsible for ovulation.
- Aberration in this process can result in the failure or inadequate release of GnRH from the hypothalamus.
- Thus, the positive-feedback mechanism of oestradiol on the LH surge may not be functioning properly in cows with follicular cysts.
- Besides the irregularities in this surge, the LH pulse pattern during the periovulatory period might have a critical role to play in the successful process of ovulation.
- The exact role of LH in the disease process is still not clearly understood.

OVARIAN DYSFUNCTION

- The cellular changes may be in the form of aberrant production of growth factors by the granulosa cells or the inappropriate secretion of extracellular matrix (ECM) proteins.
- Among ECM proteins, vitronectin and fibronectin may have a role as their production seem to be influenced by the size of the follicle.
- Excess and inappropriate production of ECM proteins may interfere with ovulation leading to anovulation.
- A recent report, based on steroid receptor content in cysts, suggested that alteration in the steroid receptors, particularly progestins and oestrogens, may result in anovulation (Odore et al. 1999).

PREDISPOSING FACTORS

- Several factors have been linked to the development of COD in cows.
- The heritability of this condition is believed to be low. However, COD seems to occur more frequently in certain bloodlines of cattle.
- It is possible that in breeds with genetic predisposition to COD, selection to increase milk production can increase the incidence of COD.
- This condition has been observed more frequently in older cows during their second to fifth lactation.
- The occurrence is believed to be higher during winter months. Lack of exercise and feeding rations high in protein to increase milk production are thought to be contributing factors in the development of cystic follicles during winter months.
- However, photoperiod was not determined to affect hypothalamic function that may predispose cows to COD.
- The role of nutrition and milk production is interrelated. COD is commonly seen in high producing cows during early lactation. At this time, much of the cow's energy is devoted to milk production, in addition to basic maintenance requirements, leaving the cow vulnerable to metabolic and endocrine disturbances.
- The role of phyto-oestrogens is not fully elucidated; however, researchers suggest that forages containing high concentrations of oestrogenic compounds might be associated with COD.
- Another contributing factor that may play a role in the pathogenesis of COD is delayed uterine involution and early postpartum problems such as retained fetal membranes, milk fever and metritis.
- It is suggested that postpartum uterine infections might stimulate PGF2alpha and cortisol secretion that predisposes cows to COD.
- In addition, bacterial endotoxins released in the uterus may stimulate cortisol secretion, which in turn suppresses pre-ovulatory surge-like release of LH.
- High producing cows under such stressors are prone to various reproductive problems especially COD.
- The role of stress in the pathogenesis of COD is believed to be mediated by the release of endogenous cortisol through inhibition of LH release.

- Endogenous opioid peptides (produced in the hypophysis and brain) are believed to block the oestrogen-induced LH surge and the release of hypothalamic GnRH. Stress may mimic the action of these peptides in postpartum cows.

FATE OF CYSTIC FOLLICLES

- The follicular cysts may undergo any of the following changes by yet unknown mechanisms.
- Either they may lose dominance and a new dominant follicle may develop and ovulate, or they may be replaced by yet another cystic follicle.
- In certain cases, the cystic follicle may be luteinized or can simply persist as a cystic follicle.

DIAGNOSIS

Diagnosis of COD can be made based on behavioural abnormalities, per rectal palpation findings, trans-rectal ultrasonography findings of the ovaries and reproductive tract, plasma or milk progesterone concentrations, and behavioural abnormalities.

TREATMENT

- It has been reported that about 60% of cystic cows recover spontaneously before the first postpartum ovulation.
- Prior to the advent of hormonal preparations, manual rupture of the cyst during rectal palpation was practiced to treat the condition at postpartum routine reproductive examination.
- This method of treatment cannot be recommended because it can cause trauma or haemorrhage, which might result in ovariobursal adhesions.
- Hormones that induce the release of LH from the anterior pituitary (e.g. GnRH), or have LH-like action (e.g. hCG @ 5000 IU by intravenous route), or LH itself can be used to treat follicular cysts.
- The former two are preferred rather than the last. It has been accepted that because of its small molecular size, GnRH is not likely to stimulate an immune reaction, as it occasionally occurs after hCG or LH administration.
- Following GnRH treatment, a surge-like release of LH occurs.
- In most of the cases, luteinization occur followed by luteolysis (about 16–18 days later).
- In all these cases, cows resume a normal oestrous cycle within 21 days.
- The compound, hCG has been used successfully for treatment of “refractory follicular cysts” that do not respond to GnRH treatment.
- As this compound has LH-like action, it acts directly on the ovary and causes luteinization of the cyst with subsequent increase in plasma progesterone concentrations.
- This luteinized structure has to be treated with PGF2alpha. PGF2 causes regression of luteinized cysts, with oestrus occurring within 8 days in 87–96% of treated cows.
- Recently, a study determined two combination of GnRH with PGF2alpha (day 0: GnRH, day 7: PGF2alpha, day 9: GnRH and 16 h later timed-insemination or day 0: GnRH, day 7: PGF2alpha, and inseminate at the induced oestrus within 7 days) as treatment for cystic conditions (Bartolome et al. 2000).

REFERENCES

Bartolome, J.A., Archbald, L.F., Morresey, P., Hernandez, J., Tran, T., Kelbert, D., Long K., Risco C.A and Thatcher, W.W. (2000). Comparison of synchronization of ovulation and induction of estrus as therapeutic strategies for bovine ovarian cysts in the dairy cow. Theriogenology. 53(3):815-25.

Hooijer, G. A., Lubbers, R.B.F., Ducro, B. J. and Van Arendonk. J.A.M. (2001). Genetic Parameters for Cystic Ovarian Disease in Dutch Black and White Dairy Cattle. *J. Dairy Sci.,* 84:286–291.

Odore R., Re, G., Badino, P., Donn, A., Vigo D., Biolatti, B and Girardi C. (1999). Modifications of receptor concentrations for adrenaline, steroid hormones, prostaglandin $F_{2\alpha}$ and gonadotropins in hypophysis and ovary of dairy cows with ovarian cysts. *Pharmacol Res.,* 39: 297– 304.

Theileriosis: - An important haemoprotozoan disease of bovines and its Management

Alok Singh[1], Shanker K.Singh[2], Raghvendra Prasad Mishra[3] ,Sanjeev Kumar[4] and Akhil Patel[5]

[1] Mvsc Scholar,[2]Assistant Professor, Department of Veterinary Medicine,[3]PhD. Scholar Department of Veterinary public health,[4]Ph.D. Scholar Department of Veterinary Parasitology,[5]Ph.D. Scholar Department of Veterinary Gynaecology & Obstetrics
College Of Veterinary Science & Animal Husbandry, DUVASU, Mathura- 281001 (U.P.)
Corresponding Author: aloksinghvet.87@gmail.com

ABOUT THEILERIOSIS

- Theileriosis is an important tick born haemoprotozoan disease which infects both wild and domestic bovidae.
- The disease caused by Theileria spps.
- Theileria is a member of suborder Piroplasmorina.
- Both WBC and RBC of mammalian host is used by Theileriae to complete its life cycle.
- Exotic cattle (all age group) are highly susceptible to the disease while on other hand the claves of the Indigenous cattle are also considered as most susceptible one.
- Disease is mainly characterized by high fever, lymphoproliferative disorders and anemia.

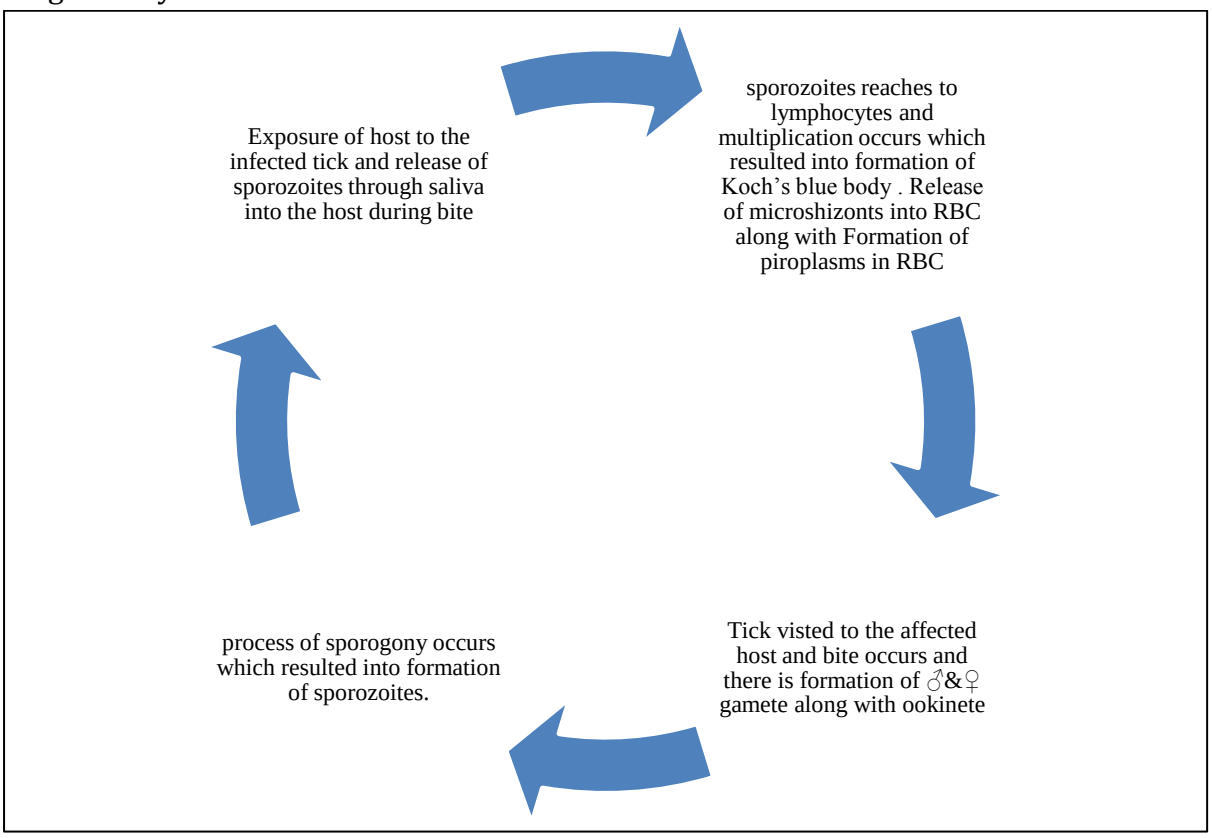
ETIOLOGY AND HOST

- T. *annulata* ,T. *parva* , T.*mutans* are the species of the Theileria which works as an etiological agent to produce clinical symptoms in cattle.
- T. *annulata* and T. *parva*, are considered as most pathogenic and economically important.
- Out of these etiological agents T.*annulata* is considered as major one to cause disease in Indian subcontinent.
- Disease caused by T.*annulata* is called as Bovine tropical theileriosis.
- T.*annulata* is an apicomplex protozoon.
- Erythrocytic form and Schizont form are the two forms of the parasite.
- Tropical theileriosis a disease caused by T.*annulata* leads upto 90% mortality.
- In cattle and water buffalo subclinical infections are common.
- The water buffalo is considered to be the natural host in which the parasite evolved

TRANSMISSION METHOD

- The chance of occurrence of disease increases in summer and rainy season because the activity of vectors increases in this season beside this stress which increases in hot and humid condition also play important role in precipitation of the disease.

- Ixodid ticks are responsible for transmitting the disease, and they posses complex life cycles in both vertebrate and invertebrate hosts.
- The disease caused by T. *annulata* is transmitted by bite of ticks of the genus Hyalomma.
- Ticks can remain infected for about 2 years in the pasture although this is greatly influenced by the climatic conditions of the surrounding areas.
- Life cycle of Theileria can represented as under following:-



- Survival of disease condition is not possible in the absence of vectors.
- Those population of cattle which recovers from the disease condition, works as carriers.
- Instead of Transovarial transmission ,trans-stadial transmission is reported in Theileria spps.

CLINICAL SIGNS

The clinical signs associated with the disease condition are as under following:-

- High fever which may reach upto 106°F (42°C).
- Mucous membranes of the conjunctiva shows marked petechial and ecchymotic haemorrhage .
- Anorexia develops and the animal rapidly losses the condition.
- Lacrimation, nasal discharge.
- Enlargement of regional superficial lymph nodes.
- Pale mucous membranes (anaemia) or jaundice.
- Tense eye balls, corneal opacity.
- Restlessness and rough coat.
- Terminally dyspnea is common.
- Increase heart rate, respiration rate.
- Occasionally nervous signs also present.
- Terminally there may be Haemorrhagic diarrhoea.

DIAGNOSIS

- On the basis of history, clinical signs and laboratory findings.
- Theileriosis should be suspected in tick infested animals with a fever and enlarged lymph nodes.
- Examination of smears of blood and lymph node biopsy will reveal piroplasms in erythrocytes and schizonts in lymphocytes.
- Molecular test--- PCR.
- Serological test---- IFA, ELISA, CFT, CAT.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis should be done from the following conditions:-

- Babesiosis
- Anaplasmosis
- Trypanosomosis
- Malignant catarrhal fever

TREATMENT

- Single Injection of Buparvaquone is used as chemotherapeutic agent @ 2.5mg/kg BW. via intramuscular route.
- Broad spectrum antibiotics such as Tetracycline, Oxytetracycline may also be used.
- In calves, supportive treatment for anemia is also indicated.
- Halofuginone lactate @ 1.2 mg/kg BW,orally is also effective.

PREVENTION AND CONTROL

- As we know tha theileriosis is generally transmitted due to infestation of ticks so control can be achived by using acaricides to kill the ticks population.
- Use of acaricides are questionable due to
- Cost related factor i.e Expensive acaricides.
- Cause environmental damage.
- Over period of time ticks develop resistance to them and there is need to develope new acaricides.
- Strategic tick control and vaccination are considerd as more sustainable and reliable methods for the control of theileriosis when used in a combination.
- A schizont cell culture vaccine " RakshaVac-T" can be used initially at 3 month of age and immunity last upto 3 yrs. But in endemic areas vaccine should be repeated in annually basis.