Veterinary preventive medicine (Vetm 5233)

Production system and their relevance to animal health

Pastoral production system

Objective:

At the end of this session you will be able to:

- Identify the characteristics of pastoral production system.
- Design animalhealath scheme for the system.

Nomadism

- Nomads are, literally, those who lead a nomadic life.

- Nomadism is a livestock production system which practiced in the tropics and other parts of the world.

- **Pastoralism** is the branch of agriculture concerned with the raising of livestock.
  - the practice of herding as the primary economic activity of a society.
  - "Pastoralism" often has a mobile aspect but this can take many forms and be at different scales.

- **Nomadism:** the migration of the entire group with animals, whereby “pure nomads” concentrate on pastoral animal husbandry and are not involved in farming.

- **Semi-nomadism**: predominantly oriented towards pastoral animal husbandry, but farming may be done partly.

- **Transhumance**: migration with a herd with the necessary herdsmen and parts of their families.

The relative advantages of nomadic production system:

- The exploitation of autochthonous breeds adapted to a location.
- Some of the breeds in this system are relatively resistant to some of the vector-borne diseases.
- The traditional knowledge and experience which the nomads have about the seasonal occurrence of disease vectors and pathogens, is helpful to protect animals from infection.
    - For example, grazing cattle at midday and late evening during the inactive time of Tsetse flies.
    - Keeping cattle around smoke of a grass fire in the evening to protect from haematophagous flies and mosquitoes.
    - The knowledge of the nomads about edible and poisonous plants is remarkable

- Disadvantages of the nomadic production system:

- Lack of knowledge or lack of interest about the connection between the keeping and feeding of calves as well as the infectious causes of infertility.

    - Example, the poor feeding and keeping of calves as well as a lack of interest in regularly removing the ticks from the calves.

- There are many obstacles to veterinary services in pastoral areas:
  - Difficult environment
  - High cost of delivery due to poor infrastructure
  - Illegal operators
  - Low cash economy
  - The mobility of pastoralists
  - Insecurity
- To bring the veterinary services closer to the livestock owners, most countries have introduced community animal health workers (CAHWs).

Disease prevention

Vector borne disease

- Systematic vector control or chemoprophylaxis of vector-borne diseases are both untenable and contraindicated with the nomadic production system.
- No public infrastructure in developing countries is in position to organize or finance such a program.
- It is possible that the calves do not become premunized at the right time and can lethally infected during migration in a heavily infested vector area.
- In haemoparasite endemic area, the application of long acting tetracycline may be helpful for supporting the organism of the young animal in building up its premunity.
- Regularly collect ticks from calf to prevent a heavy tick burden and to lessen natural infection which help the calf to develop a premunity.

Soil borne diseases

- Grazing rotation

- Provide animals with minerals (phosphorus)

- Application of vaccines
  - An effort should be made to achieve long-lasting protection with booster vaccinations for calves.

Contact diseases

- Vaccination.
  - Short term vaccination interval necessary for protection is economically untenable for nomadic production system.

- Encourage private initiatives amongst the nomads so that they get their calves vaccinated a number of times against common diseases such as CBPP, brucellosis.

- At the same time, the adult animals could be vaccinated.

- Vaccinations should be carried out in sufficient intervals.

Endoparasites

- Cause considerable loss in nomadic production system.
- Improve the keeping and feeding of calves support the development of immunity against endoparisites.
- Chemotherapeutic or chemoprophylactic
  - Anthelmintic treatment of calves if the animal owner in the position to acquire.
- Reducing overstocking

Mineral deficiency

- It is a considerable problem in pastoral animal husbandry.
- The degradation of the pasture leads to extreme conditions of lack of fodder, which enhances the development of botulism.
- Providing minerals licks at the watering points is an indispensable aid for maintaining the health and productivity of the herds.

Small holder livestock production systems

Objectives:

At the end of this section you will be able to:

- Identify the characteristic features of the production system.
- Familiarize with the disease commonly occurred in the production system.
- design animal health scheme for the system.

Characteristic features

- Small holder farming is found in the tropics and subtropics.

- The main income for small holder farmers is derived from crops.

- The economic functions of small holder farming:
  - Self supply of milk and meat
  - Drought power for land preparation
  - Producing dung for soil fertility or fuel as necessary
  - Increasing the farm income by selling milk and dairy products.

- The size and structure of the farm can vary from purely subsistence farms to integrated crop-animal production farms.

- The relative advantages and disadvantages of small holder animal production systems integrated with crop farming:

- Advantage
  - The availability of by-products or harvest remains from the crops,
  - Little traditional knowledge and little interest in animal husbandry is required.

- Disdvantage
  - The replacement of robust indigenous breeds with exotic ones due to unplanned and indiscriminate use of AI,
  - Poor utilization of available resources
  - No knowledge of how to produce balanced feed rations
  - Keeping animals communally on degraded community pasture during the cropping season.
  - Inadequate care of young animals

Disease complex

Disease complexes of small-holder animal production system are:

- Vector borne diseases in areas where exotic breeds have replaced autochthonous ones,
- Soil-borne diseases
- Contact diseases such as FMD, brucellosis, tuberculosis CBPP
- Endoparasites in young animals
- Plant poisoning if exotic breeds are grazed on stubble
- Mineral deficiencies

Animal health schemes

- It is possible to set up animal health and extension service which could take advantage of the existing infrastructure for milk collection or AI.
- There is the possibility to develop disease preventive strategies which considered the farm situation and seasons.
- **protection against vector-borne diseases**:
  - Breeding programme that maintains the autochthonous resistance potential must be chosen
  - Using acaricides and pesticides Judiciously
  - Build up a life-long unsterile immunity through natural premunization
  - Keep adapted breeds which can tolerate exposure to the challenges of infection.
  - Stabling (zerograzing) and feeding of high producing breeds in such a way that they remain tick-free.
  - Keeping the hygiene of the farm to prevent the development of biting arthropods

Protection against soil-borne diseases:

- It is possible through improvement in the keeping and feeding of young animals as well as through farm specific booster vaccinations for the calves.

- Proper harvesting of fodder, storage, and formulation of balanced feed rations with required percentages of minerals and trace elements.

- Vaccinate animals at the best time of the year for creating maximum immunity in the mother animal.

- Double immunization of young animals between the ages of 6 and 12 months.

Endoparasites prevention

- Good animal keeping and feeding
- Chemotherapeutic and chemoprophylactic treatment of young animals
- Applying appropriate extension

Animal health intervention actors

- To develop the interest of farmers with health interventions and to guarantee the continued existence of preventive measures, it is wise to divide the cost and tasks involved as public and private commodities.

- The public veterinary services would be limited to:
  - Coordination of vector control
  - Organize tsetse control in the environs of the animal
  - Organize and finance vaccination campaign against transboundary diseases such as FMD, CBPP etc.
  - Provide diagnostic services for disease incidence

- Private commodities, whether by the farmers themselves or through cooperatives or small-holder organizations, would be left with the following:

  - Plan suitable breeding and farm management programmes which would minimize vector borne disease incidence and integrate natural and artificial methods of premunization into them.

  - Decentralized vaccination (at villages or farms level) to prevent local contact and soil-borne diseases.

  - Targeted use of anthelmintics to reduce calf loss caused by endoparasites.

  - Offer supplementary feed and minerals to prevent deficiency diseases and soil-borne diseases.

Ranching

Objectives:

At the end of this session you will be able to:

- know the characteristics of ranching
- Prevent and control diseases of the system

Organization

- Ranches are extensive farms with cattle and/or sheep which are designed to produce meat, milk, wool or skins.

- Ranches are found predominantly in the semi-arid pasture belt of the southern hemisphere as well as in the USA, Central and South America, southern and southeastern Africa, and in Australia.

- Characteristic for ranching:
  - Grazing carried out on the land available on the ranch without any additional purchase of feed, or the laying on of feed reserves using hay and silage.
  - Feed reserves for the dry season are created by sparing pastures or by irrigating natural or seeded grassland.
  - The stocking rate determined by taking the amount of feed grown in bad year as the standard.

- The intensity of exploitation of a ranch is dependent upon environmental prerequisites, its capital base and the production target of the farm.

- The loss of calves as well as the incidence of disease in adult animals increases rapidly with introduction of rotating pasture, fencing, increase of the stocking rate, purchasing of breeding animals and the use of some breeds (taurine breed).

    - demand a considerable expenditure for their control.

- With intensification
  - The incidence of vector borne diseases increases
  - The resistance of the autochthonous animals becomes lost.
  - Soil-borne diseases increasingly cause losses amongst young animals
  - Contact diseases result from the purchase of young animals, stress caused by increased productivity, increase stocking rate, and failure of health management
  - Plant poisoning increases
  - Parasites as well as deficiency diseases result from inadequate farm management.
- The advantage of large and financially well supplied farm is that they can put a farm specific animal health scheme with a private veterinary service into action independent of the government infrastructure.

Animal health scheme

- The prerequisite for an effective disease prophylaxis on a ranch is the integration of the management of animal health into the normal running of the ranch.

- Ranch farm is in a position to be able to control animal transportation and to be able to put an independent animal health concept into action on its own.

- The animal health scheme of a ranch which operates under various ecological and economical conditions can be organized as follows:

    - Controlling vector in the rainy season using dipping, spraying, or with dermal application in the dry season (Pour-on/spot-on).

    - Control tick transmitted disease in calves by premunized naturally through a light tick invasion in the dry season.

    - Protect calves from enzootic soil-borne and contact diseases with a booster vaccination during and after weaning.

Animal health scheme...

- Protect mother cows, replacement and bulls against enzootic contact diseases with a booster vaccination before the rainy season at the time of weaning.
- Adult animals and replacement can be vaccinated once against soil-borne diseases at the beginning of the dry season.
- If it is necessary and economically tenable, the calves can be chemoprophylactically treated against endoparasites at the time when the mother animals are being classified, as well as when they are being weaned.

- The concept described integrates the ecological and operational cycles in such a way as to be able to utilize the point in time when the animals are best disposed towards an immuneresponse.

Animal health scheme...

- Prerequisite for carrying out animal health scheme is the availability of private or public veterinary service on the ranch which can plan, coordinate and carry out the necessary measures.

- During a disease outbreak a precise diagnosis should be done.

- The owners should be assisted by the veterinarian (by making diagnostic examination) when purchasing stock not to bring latently sick animals into the farm.

- Apart from controlling vector-borne, soil-borne and contact diseases, the available resources of the ranch must be utilized for removing the breeding and hiding places of the vectors and endoparasites. This includes:
  - Draining swampy areas and build suitable drinking troughs.
  - Introduction of appropriate pasture management
  - place weaned animals to dry, high-lying pasture which are low in parasites

Feedlots

Objectives:

At the end of this session you be able to:

- Describe feedlot
- Explain the epidemiology of disease in feedlot cattle
- Identify the endemic disease in feedlot
- Describe metabolic diseases in feedlot

The feedlot description

- The beef cattle industry comprises a range of production systems, including breeding (cow-calf; suckler) and fattening (feedlot) enterprises, which are managed under differing conditions.
- Feed-lot is an intensive fattening operation where cattle or sheep are penned in groups for fattening.
- Young growing animals are fed a high-energy diet to produce marketable beef at the lowest cost and in the shortest time table.
- Young animals can be removed from the grazing areas, perhaps as soon as they have been weaned, and can also be economically fattened using agro-industrial by products.
- Depending on the starting body weight and age of cattle, the period of confinement and feeding varies from 60 days to 12 months.
- Fattened animals bring higher profits.
- A feed lot is usually operated in a farming area.
- The intensive production technique of a feed-lot allows for the technical and economical application of disease prevention schemes which are not feasible on extensive farms.

Epidemiology of disease in feedlot cattle

- The morbidity rate, case fatality rate, and population mortality rate associated with feedlot cattle disease vary among feedlots and depend on several factors.
- Mortality rates are higher in beef calves 6 to 8 months old (2% to 4%) than in yearling cattle (0.5% to 1%).
- 70% of the morbidity occurs within the first 45 days in the feed lot, whereas only 40% of deaths occur during that same period.
- The disease epidemic information is valuable in feedlots to formulate control and treatment strategies.
- The most economically important diseases of feedlot cattle are infectious disease and diseases associated with intensive feeding of high-energy diets.

Epidemiology of .....

- There are several epidemiological determinants that are usually associated with diseases of feedlot cattle.
- The animals are usually young (7 to 15 months old) and often originated from several different sources and thus have unequal acquired resistance to infectious disease, especially respiratory disease.
- Respiratory disease accounts for 75% of illnesses and 45% to 55% of mortality in large feedlots.
- The incidence of fatal fibrinous pneumonia is strongly associated with the commingling or pretransit.
- Season of the year is correlated with respiratory morbidity and mortality rates.
- The incidence of respiratory disease is higher in auction origin cattle than in ranch source cattle.

Epide....

- Other minor diseases of the respiratory tract that occur in feedlot include:
  - atypical interstitial pneumonia, bronchiectasis, brisket disease and embolic pulmonary aneurysms in yearling cattle
  - Diphtheria and tracheal edema, or honkers.
- Bulling among steers is a common health and economic problem in feedlot operations.
  - The economic loss is related to physical injury, stress and the necessity of early isolation of the affected animals.
  - The prevalence of bullers generally range from 2% to 3% of a feedlot population.

Endemic diseases of feed-lot stock

- Feeder calves which are brought from differing environmental regions to a feed-lot are subject to many challenges:
  - Climate change,
  - Transportation stress and exposure to infection
  - Exposed to unfamiliar environment
  - They have neither passive maternal protection nor they develop their own active immunity.
  - Intensive contact in feedlot with animals from different origin
  - Intensive exposure to infection through the feed, water, floor of the pen
  - Challenge to the organism through an abrupt change in feed, and being fed with high-energy rations
  - Management measures: vaccination, tagging, weighing, separation, etc

Endemic .....

Endemic feedlot diseases in site specific situation corresponding to the complexes of:

- Vector borne diseases: LSD, Trypanosomosis, babesiosis, theileriosis, anaplasmosis, heartwater, rabies in vampire regions.
- Soil-borne diseases: enterotoxaemia, anthrax, and botulism.
  - Gas gangrene and tetanus occur occasionally.
- Contact diseases: CBPP, FMD, pasteurellosis, stomatistis, vesicularis, IBR.
- Diseases caused by spoiled or poisoned feed: mycotoxicosis and poisoning caused by poisonous principles from oil cakes.

Endemic .....

- The causes for the occurrence of the aforementioned individual disease complexes in tropical feed-lots are particularly varied and include:
- For vector-borne diseases
  - The introduction of infected animals
  - Insufficient vector control in the feed-lot
- For soil borne disease
  - An abrupt change in feed to an high-energy ration (molasses) with a high percentage of dry matter
  - Feeding with contaminated bone, carcass, fish-and blood meal (anthrax and botulism)
  - Contamination of the soil of the pen with B. anthracis spores

Endemic .....

- In case of contact diseases
  - Transportation and adaptation stress (“crowding”) (Pasteurellosis, FMD)
  - Inadequate selection and diagnosis (Tuberculosis, CBPP, paratuberculosis)
  - Inadequate immuno-and chemoprophylaxis
  - Use of contaminated feed (FMD, brucellosis)

- Hazards through contaminated or toxic feed
  - Using oil cakes containing poisonous plant principles (cottonseed, meal, soya cake) as feed
  - Mouldy concentrates, straw and silage with, for example, high aflatoxin content. Sugar cane tops can also be contaminated with mycotoxins.

Metabolic diseases

- There are four main metabolic diseases feedlot operators need to be aware of:
  - polioencephalomalacia (polio),
  - acidosis,
  - rumenitis and
  - bloat.
    - these are not infectious diseases and therefore are not contagious.
    - They do have one thing in common, they occur primarily in cattle fed high grain finishing rations.

Feedlot Polio

- **Feedlot Polio** is caused by a deficiency of the B vitamin, thiamin.
- Thiamin is required by the animal for energy metabolism.
- When it is deficient the brain essentially is starved of energy.
- In normal situations, rumen microbes synthesize enough of all the B vitamins so that they don't have to be provided in the feed.
- In America, about 1% of feedlot cattle develop polio as a result of thiamin deficiency.
- The disease is sporadic in that a feedlot may go several years without a case and then have several cases in a single group of cattle.

Feedlot Polio

- The occurrence of polio is associated with high grain feeding (greater than 85% concentrate in the diet) and usually occurs shortly after switching cattle to their finishing diets.
- At this time, the rumen microbes are adjusting to the new source of feed and acidosis (low rumen pH) is common.
- Certain bacteria in the rumen produce thiaminase in this situation which is an enzyme that destroys thiamin and also results in thiamin like compounds which block the action of the true vitamin.
- Cattle that are affected by polio have normal thiamin production but it is being destroyed before the animal can use it.
- This causes rapid problems for the animal.
- Cattle with polio display symptoms of listlessness, incoordination and convulsions.
- Death occurs rapidly if cattle are not treated.

Feedlot Polio

- Fortunately, treatment is simple and results in rapid recovery.
- Afflicted cattle should be given an IV injection of thiamin solution (2 grams for a 700 lb calf) two times per day for two days.
- They should be pulled from the pen and fed roughage.
- After recovery they should be slowly readjusted to their finishing diet.
- Feeding thiamin as a preventative measure is not recommended because it may actually stimulate production of thiaminase and interfering compounds.
- Methods of reducing acidosis are beneficial in preventing polio.

Acidosis

- As the name implies, acidosis occurs when the rumen and the blood become acidic.
- It is caused by two factors:
  - excess acid production in the rumen and
  - decreased buffering of the rumen digesta as a result of decreased saliva flow.
- Saliva contains large amounts of sodium bicarbonate which is a buffer that neutralizes acids.
- Acids in the rumen are produced by rumen bacteria during the fermentation of feed.
- These acids are absorbed and provide the major source of energy to cattle.
- Two types of acidosis occur; acute acidosis and subacute or chronic acidosis.
- Acute acidosis is uncommon in well managed cattle.
  - It usually occurs when non-grain adapted cattle accidentally gain access to a large quantity of grain and engorge themselves.
  - This results in a rapid drop in rumen and blood pH (due to excess acid production during fermentation) which often causes sudden death.

Acidosis.....

- Subacute acidosis is more common in feedlot cattle and is more costly to the producer.
- Subacute acidosis occurs when feedlot cattle fed high grain diets are not able to balance acid production with the buffering capabilities of saliva.
- Cattle normally produce 5 to 10 gallons of saliva daily. Most of this saliva enters the rumen during rumination, the cud chewing process.
- When finishing diets low in roughage are fed, cattle are not able to regurgitate effectively which greatly reduces rumination, saliva flow and subsequently buffering capacity.
- The cattle feeder must always walk a tightrope between high acid production and excessive rumen acidity.
- High grain diets are necessary to maximize performance and economic returns; however, chronic acidosis may cause founder and reduces feed intake, growth and economic return.

Acidosis.....

- The best ally in combating acidosis is the use of ionophores such as Rumensin and Bovatec.
- These compounds reduce the incidence of acidosis and are largely responsible for the ability to successfully feed diets with little or no roughage.
- The role of roughage in a feedlot diet is to stimulate rumination which reduces acidosis.
  - However, excessive use of roughage is costly and decreases growth and feed efficiency.
- The incidence of acidosis can also be reduced by feeding whole corn rather than processed corn and by feeding more than once a day.
  - These practices reduce acid load in the rumen by spreading out the fermentation of starch throughout the day.
- Good bunk management is also important for hand fed cattle.
  - Empty bunks followed by over feeding the next day often causes acidosis.

Rumenitis

- Rumenitis is an inflammation or irritation of the rumen wall.
- It is caused by long term feeding of high grain diets which results in continuous acidic conditions and lack of physical stimulation or abrasion of the tissue.
- Feeding some roughage provides a “scratch factor” which helps keep the tissue healthy.
- Like acidosis, a low level of rumenitis is a fact of life when high grain diets are fed.
- In general, the problem worsens the longer cattle are on their finishing diet.
- When rumenitis becomes severe, the tissue lining the rumen wall becomes ulcerated and is no longer effective in absorbing nutrients.
- We see this as cattle that stop growing towards the end of the feeding period.

Rumenitis

- Ulcer leads to liver abscesses.
  - When ulcers develop in the rumen wall, bacteria normally present in the rumen pass through to the blood, travel to the liver and cause abscesses.
- only cattle with severe liver abscesses have reduced performance.
- Feeding antibiotics, such as chlortetracycline, reduce the incidence of liver abscesses but do not prevent rumenitis.

Feedlot bloat

- One of the results of ruminal fermentation is gas production.
- In normal situations, cattle are able to belch and relieve this gas that is produced.
- Feedlot bloat is not caused by increased gas production, but rather, the inability to release gas via the belching process.
- The use of finely ground feeds promote foaming or frothiness in the rumen.
- This increases the incidence of bloat because the gasses are trapped in the foam and belching is prevented.
- High grain diets also encourage the growth of certain rumen bacteria which produce a slimy substance that traps gasses.

Feedlot bloat

- Acidic conditions in the rumen tend to stabilize the foam.
- Saliva contains antifoaming agents, but saliva production is greatly reduced on high grain diets.
- All of these factors contribute to the occurrence of feedlot bloat.
- If bloating is a problem, several steps may be taken.
- Feeding Rumensin, Bovatec, oxytetracycline, poloxalene (Bloat Guard) and/or long roughage are effective in reducing the incidence of bloat.
- Death from bloat is believed to be caused by asphyxiation.
  - The rumen becomes so distended that the animal can no longer breathe.

Activity

- Discuss in group on metabolic diseases of feedlot .

Infectious diseasease

Objectives:

At the end of this lesson you will be able to:

- Describe the common infectious disease that occur in feedlot in Ethiopia
- Plan and implement appropriate animal health scheme in feedlot
- Select proper site for feedlot

Infectious disease

- Common transboundary cattle diseases in Ethiopia include:
  - Foot and mouth disease (FMD),
  - Lumpy skins disease (LSD),
  - contagious bovine pleuropneumonia (CBPP).
  - Shipping fever

Shipping fever

- Shipping fever of cattle is a syndrome characterized by elevated body temperature, dyspnea, and pneumonia.
- It is triggered by the stresses associated with handling and shipping cattle.
  - Possibly because of the added stress of the weaning procedure.
- light calves appear to be more susceptible to shipping fever than do yearling feeder cattle.
- The shipping fever syndrome is probably the greatest loss to the cattle feeding industry of any common disease complex known, except where outbreaks of foot and mouth disease might occur.
- Some estimates for losses due to shipping fever in cattle run as high as 25 million dollars per year.

Shipping fever

- Many factors contribute to the avoidance of the shipping fever syndrome, including:
  - (1) good nutrition-especially a well-balanced protein supplement, adequate energy and minerals, and higher levels of vitamin A in the range of 50,000 IU per head daily;
  - (2) proper care and management, including a comfortable, dry, draft-free, quiet place to recuperate; and
  - (3) therapeutic levels of antibiotics and sulfa for the first 14 to 28 days on the farm.

FMD

- Foot-and-mouth disease (FMD) is a highly contagious disease of domesticated and wild ungulates characterized by vesicles in the mouth and on the feet.
- FMD is an extremely contagious disease, with as few as ten infectious units being able to initiate disease in a bovine by the respiratory route.
- It is endemic in Ethiopia.

Seroprevalence of foot and mouth disease in feedlots in Ethiopia

- From a total of 38187 bulls examined for the presence of FMD antibodies, 5536 (14.5%) were found positive.
- The seropositivity of FMD varied from site to site.

Table: Seroprevalence of FMD in relation to site of feedlot operations

Site	No of tested	No of positive	Seropositive (%)	95% CI
Dera	2090	745	35.6	33.6-37.7
Modjo	484	16	3.3	1.7-4.9
Migra	12180	1468	12.1	11.5-12.6
Wanji	2136	77	3.6	2.8-4.4
Koshe	6399	888	13.9	13.0-14.7
Meki	3544	1327	37.4	35.8-39.0
Awash Melkasa	2417	518	21.4	19.8-23.1
Awash Sebat	4338	335	7.7	6.9-8.5
Nahmaled	3469	106	3.1	2.5-3.6
Adami Tulu	1130	56	5.0	3.7-6.2
Total	38187	5536	14.5	14.1-14.9

LSD occurrence in feedlot cattle in Ethiopia

- From the total of 11189 bulls observed during outbreak investigation of LSD in six sites of feedlot operation in and around Adama, 681(6.1%) and 204 (1.8%) bulls were found affected and dead with LSD, respectively.

Table: Morbidity, mortality and case fatality rates of LSD in relation to site

Site	PAR	New case	Dead	Morb. (%)	Mort. (%)	CFR(%)
Boku	817	89	25	10.9	3.1	28.1
Dera	1050	15	5	1.4	0.5	33.3
Koshe	2263	269	109	11.9	4.8	40.5
Migra	1771	74	24	4.2	1.4	32.4
Nahmled	4055	158	25	3.9	0.6	15.8
Wanji	1233	76	16	6.2	1.3	21.1
Total	11189	681	204	6.1	1.8	30

PAR=Population at risk; Morb. =Morbidity; Mort. =Mortality; CFR= Case fatality rate

CBPP seroprevalence in feedlot cattle in ethiopia

- From the total of 38187 bulls examined for the presence of antibodies using c-ELISA, 150 (0.4%) were found positive.

Table: Seroprevalence of CBPP in relation to site of feedlot operation

Site	No of tested	No of positive	Seropositive(%)	95% CI
Dera	2090	14	0.7	0.3-1.0
Modjo	484	0	0.0	0.0-0.0
Migra	12180	38	0.3	0.2-0.4
Wanji	2136	4	0.2	0.0-0.4
Koshe	6399	19	0.3	0.2-0.4
Meki	3544	40	1.1	0.8-1.5
Awash Melkasa	2417	6	0.2	0.0-0.4
Awash Sebat	4338	15	0.3	0.2-0.5
Nahmaled	3469	10	0.3	0.1-0.5
Adami Tulu	1130	4	0.4	0.0-0.7
Overall	38187	150	0.4	0.3-0.5

Activity

- Discuss the feedlots practice of Ethiopia.

Animal health scheme in feedlot

Benefits will include:

- Improved disease control
- Improved profitability
- Protection against accidental introduction of other diseases
- Certification of cattle health status

Animal health scheme in feedlot

- Animal health scheme is responsible for not allowing disease to occur.
- Outbreaks of disease with high morbidity and mortality rate must not occur under any circumstance.
- The production principle of an intensive fattening operation is to optimizing of production factors and the minimizing of costs.
- The animal health concept must likewise fit into this principle.
- Minimizing the economic loss through well planed animal health is important for the viability of a feedlot.
- The operational concept of the feedlot must therefore include an animal health scheme which rigorously ensures water-tight and absolute disease control.

Animal health scheme in feedlot

The targets of the animal health concept must be:

- Isolating and cleaning up the site of feedlot from vectors and other disease reservoirs;
- Prevention of the introduction of diseases;
- Control of vector borne and infectious diseases during the fattening cycles;
- Prevention of diseases caused by management and feeding errors and of factorial diseases.

Site for feedlot

- The site is preferable not to be in the immediate vicinity of civilization centres to avoid air pollution and spraying pets.
- The positioning of feedlot should be on a hill if possible
  - For natural drainage
  - To cool animals by breezes which occur as a rule in the afternoon in the tropics
- A floor composed of gravel and rocks guarantees that mud cannot develop which means avoiding hoof damage in the rainy season.
- Mud can strongly reduce productivity and creates favourable conditions for vector reproduction.
- A feedlot can be kept practically vector-free with regular cleaning and removal of dung.
- Where multi-host ticks exist, a double fence should surround the area and the lower parts of the fence should be impenetrable to rodents.
- Make sure that the site is not contaminated by spores of pathogens of soil borne disease.

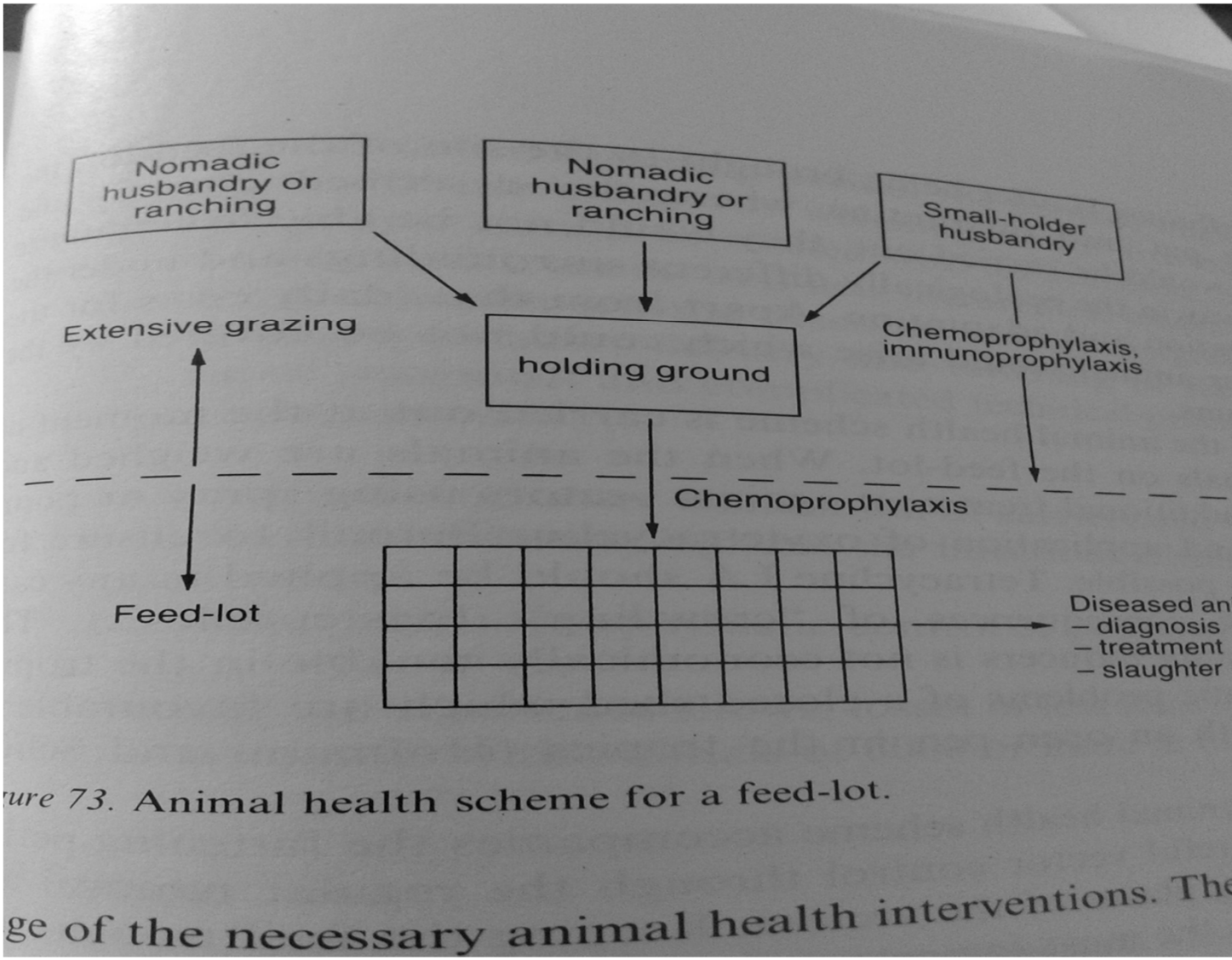
Site for feedlot

- Clear the vegetation which serve as habitat for disease vectors and treat tsetse fly resting places with a selective application of insecticides.
- Select healthy and quality animals during purchasing.

Control and prevention of disease

- Control and prevention of disease in feedlot cattle depends on:
  - purchasing healthy animals, providing a transport system that minimizes stress, and a comfortable feedlot pen environment,
  - An adequate feeding system,
  - Establishing a good surveillance system, and
  - Judiciously using vaccine, when necessary antimicrobial agents.

Preventive animal health measures can be implemented at a three-triered concept of animal health in the process of selecting animals starting at the location of the origin of the animal.



ure 73. Animal health scheme for a feed-lot.

ge of the necessary animal health interventions. The

Actions to be taken while the animals are at the farm of origin.

The first stage of the necessary animal health interventions:

- Careful selection following external inspection;
- Diagnosis in the field of latent infections with the assistance of feasible serological and allergic reactions;
- Chemoprophylactic treatment against endoparasites, ticks and haemoparasites;
- Immunoprophylaxis against soil-borne and contact diseases which are relevant at the site of the feed-lot;
- Chemoprophylaxis before transportation.
  - ❖These prevent the introduction of vectors and carries of infection to the site of the feedlot.
  - Vaccination against relevant diseases on the location of origin of the animals guarantee immunity.
  - The animals can relieved of the burden of endoparasites through a target application of anthelmintics.

Animal health schemes performed on the arrival or after the animal arrived at the feedlot

The second stage of animal health scheme is carried out at the movement of the arrival of the animals on the feed-lot.

- Quarentine: the animal should be quarantined, when it is found necessary.
- Chemoprophylaxis:
  - additional treatment against vectors using spray or pour-on.
  - Application of antimicrobial agents (such as oxytetracyclin) and antiprotozoal drugs (Berenil)to avoid the flare up of some diseases.

Third stage of the animal health scheme:

- Accompanies the fattening period
- Consists of careful vector control:
  - Regular removal and destruction of the breeding places of the vectors.
  - Spray insecticides in the area of fattening pens, if it is found necessary.

Morbidity control

- A lot of attention must be paid to morbidity control.
- The animals must be observed daily while feeding.
- Cattle which do not immediately come to the feed troughs when feed is distributed must be separated.
- They must be taken to the sick bay, and carefully examined and treated if necessary.
- When the animals recovered they should not reintroduced into the fattening paddock (they will not be accepted by other animals).
- They should be slaughtered instead.

The intensive dairy farming

Objectives:

At the end of this session you will be able to;

- Describe the dairy production system
- Explain the effect of disease in dairy productivity
- Identify diseases of intensification
- Prevent and control disease in dairy farming

Description of the production system

- The dairy industry is one of the most important components of the world food system.
- It is a large portion of the agricultural economy of many nations.
- Keeping cattle for dairy production is an integrated part of farms of all sizes in areas with farming, irrigation and permanent crops.
- Highly specialized and intensive operations produce milk in the tropics.
- Most dairy farms are connected to a milk-collecting organization and/or processing plant or an organization for AI.
- The characteristics of intensive as well as extensive dairy farms both in Tropical and temperate regions include:
  - The animals graze relatively near to the milking area or given feed purchased from the surrounding area;
  - Only female calves intend for replacement are raised with milk exchangers;
  - The lactating cows are subjected to individual control during daily milking;
  - The animals maintain contact each other;
  - Year round milk production guaranteed

Description of the production system

- Only the calves on dairy ranches and small-holders operations can be allowed to feed on milk remains after milking.
- On a dairy ranch, cows are given feed concentrate according to the amount of milk they produce.
- The genetic quality of the animals correspond to the level of intensity of the farm.
- Native animals are seldom still used for milk production, even by small-holders.
- High-productivity breeds are usually crossed with native breeds.

Trends in dairy farming

- Consumption of dairy products increased.
- Dairy farm productivity increased to meet the increased demand. Eg.
  - Between 1999-2000, per cow milk production increased by 196 Kg to reach 8257 kg per cow.
- In recent years, the structure of the dairy industry of developed countries has undergone remarkable changes.
- The changes include continued restructuring of the industry through reduced herd numbers, increased herd sizes, and adoption of specialized management practices.
- Societal trends such as increased urbanization, changes in food preferences, and unease with biotechnology will contribute to continued evolution of this industry.

Trends in dairy farming

- Currently processes of change are being driven by a wide range of forces including:
  - shifts to the regulatory environment for dairy production and trade,
  - technological changes to the production of milk and milk-products,
  - rapidly shifting consumption trends, and
  - the restructuring of transnational corporate strategies with regard to this sector.

Trends in dairy farming

- Holsteins are the predominant breed of dairy cow.
- Jerseys are the next most popular breed followed by Guensey.
- Another trend is the increased centralization of dairy farming in specific geographic locations.
- As dairy farms increase in size, the ability to attract, train, and manage labor becomes increasingly important.
- On small dairy farms, much of a dairy producer's time is spent performing actual physical tasks, such as milking, growing crops, and handling animals.
- As farms increase in size , the farmer's attention must be directed towards managing people and processes.
- It becomes necessary to delegate many tasks to others.

Trends in dairy farming

- Continued advances in the sciences of genetics, nutrition, reproduction, milk quality, and health management encourage farmers to learn to depend on others more for advice.
- The number of farmers using intensively managed grazing systems to provide forage for their cattle has also increased.
- Intensive grazing systems are promoted to reduce labor and purchased feed costs on smaller dairy farms.
- Large dairy farms have advantage in fixed production costs and tend to adopt production enhancing management techniques at a higher rate.

Health and production

- A dairy farm is a complex interrelated system that requires a great deal of coordination to achieve optimum productivity.
- Multiple and seemingly unrelated decisions on dairy farms can produce a cascade of effects that affect farm productivity and ultimately farm profitability.
- The dairy health and production management program is one mechanism that allows for consistent assessment and discussion of the farm situation.
- Increasing stocking density has the effect of increasing the risk of spread of infectious diseases and parasites.
- More intensive production using increased stocking rates and more productive pastures has the effect of increasing pasture contamination with faecal matter and shorter grazing intervals.

Health and production

The incidence of disease on dairy farms is dependent on:

- The genetic quality of the animals;
- The environmental condition and
- The overall farm management, the geographical, political and economical conditions.

Incidence of diseases in dairy farms

- The incidence of vector-borne disease is dependent on the resistance of the breed of dairy cattle.
- Soil borne disease are seldom a problem for dairy farms with sensible management.
- Contact disease are a significant health problem for dairy operations.
- In dairy ranches poisoning from pasture plants may occur.
- In intensive dairy operations, feed hazards created by protein concentrates must be considered.
- Parasites are not common on dairy farms except in small-holder production system.
- Mineral deficiencies in dairy production are related to serious management errors.

Influence of disease in productivity

- An important factor that influence dairy herd productivity is the amount and type of disease in the herd.
- Disease reduces herd productivity in many ways; it resulted in:
  - Increased culling
  - Reduced milk yield,
  - Increased adult cow mortality
  - Reduced reproductive efficiency
- The basis of disease control programs includes knowledge of the frequency of disease in the herd, information about the biologic effect of disease, and information on the effectiveness of control procedures.
- The effect of disease on productivity can be direct or indirect.
- Diseases occurring in early lactation can cause cascading effects that ultimately lower productivity. For example:
  - Cows diagnosed with parturient paresis are at increased risk of retained placenta, complicated ketosis, and mastitis.
  - Cows with retain placenta and dystocia are at increased risk of metritis.

Influence of disease in productivity

- The main diseases that cause losses to the farmer through loss of production, cost of treatment or even death of the cow are:
  - mastitis,
  - hypocalcaemia,
  - hypomagnesaemia,
  - lameness and
  - calving problems.
- A single case of clinical mastitis can result in a milk yield loss of 300 to 400 kg/lactation.
- Mastitis cases occurring in early lactation are associated with higher losses (450 to 550Kg) compared with cases that occur later.
- An extremely difficult dystocia was demonstrated to reduce milk, fat, and protein yields by 704 Kg, 24 Kg, and 21 Kg, respectively compared with yields of normally delivered cows.
- Retained placenta or ketosis reduce the peak milk yield by 6-7%.
- Low initial production may reflect poor nutrition, inadequate management, poor dry cow management, or periparturient disease problems.

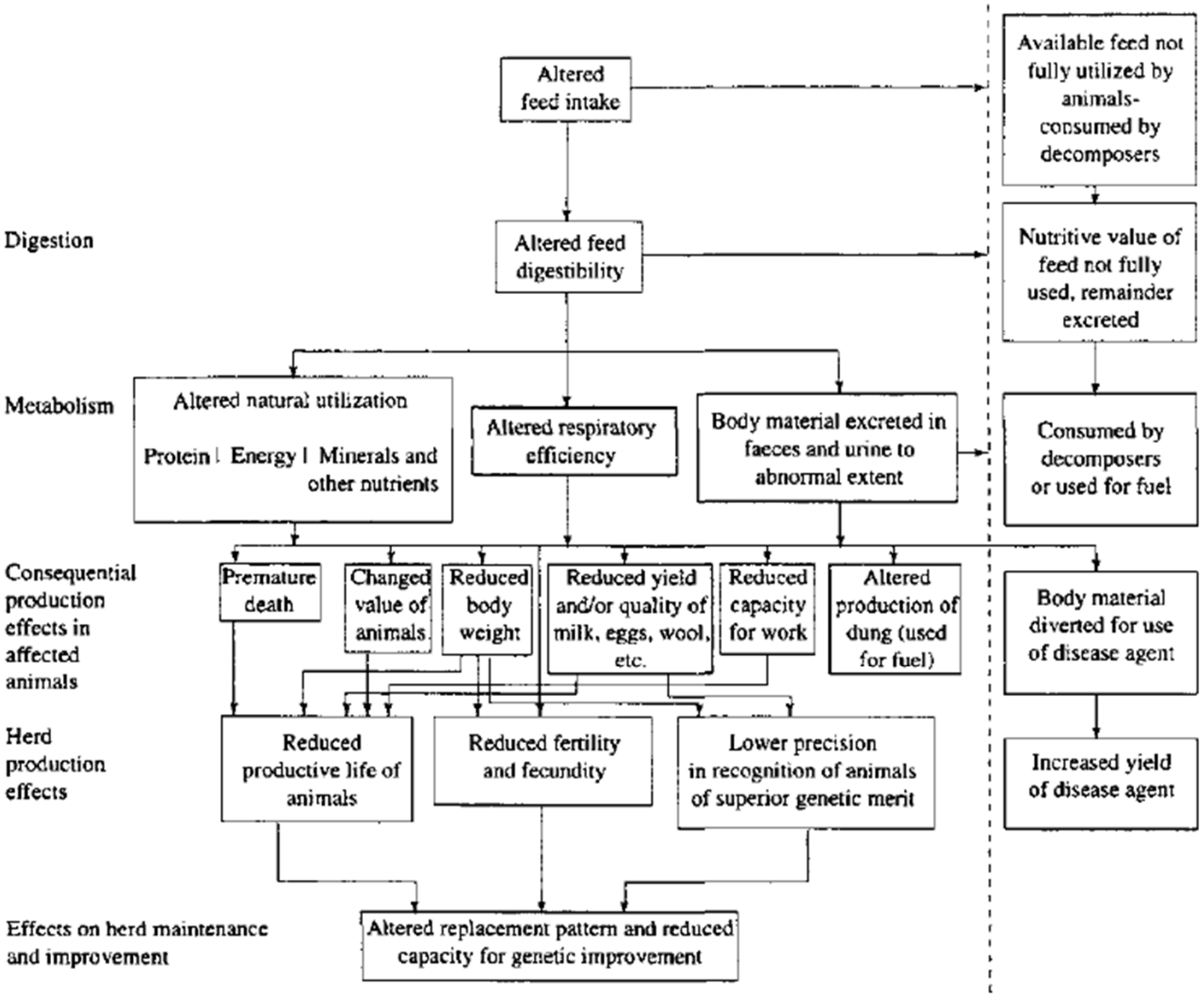


Fig.1 Effect of disease on productivity

Influence of disease in productivity

- Several common disease of dairy cattle may affect lactational milk yields, eg. Milk fever, abortion, retained placenta.
- Losses resulting from subclinical disease are often considerable.
- Diseases that delay or prohibit conception have a negative effect on herd productivity.
- The likelihood of conception can be reduced by 14%, 15%, and 21% for cows that experienced retained placenta, metritis, or ovarian cysts, respectively.
- In general, disease influences productivity by reducing milk yields, decreasing reproductive performance, and limiting the length of productive life.
- Clinical syndromes associated with metabolic diseases and infectious diseases can be minimized through advanced animal husbandry and health management programs.

Diseases of intensification

- The intensification of animal agriculture has created complex animal health and production problems.
- Intensification of husbandry in all species is recognized as a factor contributing significantly to an increase in the new infection rate.
- There are relatively few available data that can be used to quantify the effects of increased intensification of milk production on the health of cattle.
- There is evidence that increased production increases the risk of mastitis and culling for udder health.
- Larger herds with greater stocking density should increase the risk for infectious disease, but evidence to support this contention is sparse.
- Very intensive grazing patterns associated with higher grass yields achieved using better cultivars and greater use of fertilizers favor nematode parasites.
- Acidosis is a condition with a high point prevalence in pasture-based dairy systems where cows are fed supplements.
- Laminitis and acidosis are different conditions with a similar pathogenesis, specifically highly fermentable diets.

Diseases of intensification

- While epidemics of clinical syndromes still are seen, the nature of disease has changed on many dairy farms.
- The trend to larger dairy herd and shrinking profit margins encouraged a shift toward optimizing herd productivity through reduction of subclinical disease.
  - Subclinical diseases such as mastitis, acidosis, and laminitis have emerged as major limitations to productivity on many farms.

Mastitis

- Mastitis is inflammation of the parenchyma of the mammary gland.
- It is characterized by a range of physical and chemical changes in the milk and pathological changes in the glandular tissue.
- The most important changes in the milk include discoloration, the presence of clots and the presence of large numbers of leukocytes.
- Swelling, heat, pain and edema in the mammary glands.

Mastitis

- Caused by invasion of pathogenic microorganism through the teat canal.
- Mastitis can occur with a wide range of clinical signs, from subclinical to severe.
- Subclinical mastitis is defined as the presence of pathogenic organisms in the milk, and an inflammatory response that only be detected by screening test.
- The causative agent (s) can only be identified reliably from bacteriologic culture of milk.
- Somatic cell counts of milk are the most frequently employed method to detect inflammation.

Mastitis

- Clinical mastitis results when the cow's immune system responds with enough intensity to an intramammary infection (IMI) to elicit signs of inflammation that are physically observable.
  - Clinical mastitis is manifested by abnormal color or texture of milk.
  - In sever clinical mastitis, systemic involvement is apparent.
    - In this form, milk production can be decreased profoundly.
- IMIs can be described as chronic if the duration of infection, with or without clinical signs, is greater than 2 months.
- Acute mastitis generally refers to clinical mastitis cases, and more properly described the rapid onset of clinical signs rather than severity.

Etiology

- More than 140 microbial species are identified as causes of mastitis.
- Mastitis causing pathogens can be classified as contagious, teat skin opportunistic or environmental based on their epidemiology and pathophysiology.

Contagious mastitis pathogens:

- S. aureus and Str. Agalactiae - the most common
- Mycoplasma bovis, corynebacterium- less common.
- *Source of infection*: Infected cow and hands of milkers
- *Transmission:* from cow to cow by contaminated udder wash cloths, residual milk in teat cups and inadequate milking equipments.

Teat skin opportunistic mastitis pathogens:

- Coagulase-negative staphylococci- common cause.
- Create intramammary infections via ascending infection through the streak canal.

Etiology

Environmental pathogens:

- Environmental Streptococcus SPP. Including Str. ubris and Str.dysgalactiae-most prevalent.
- Str. equinus- less prevalent
- Environmental coliforms include the gram negative bacteria E. coli, Klebsiella spp., Enterobacter spp., and Arcanobacterium pyogenes.
- *Source:* the environment.
- *Transmission:* from environment to the cow by the inadequate management (wet bedding, dirty lots, milking wet udders, inadequate premilking udder and teat preparation, housing system that predispose for teat injury, and poor fly control) of the environment.

Uncommon Pathogens:

- Nocardia spp., Pasteurella spp., Mycobacterium bovis, Bacillus cereus. Pseudomonas spp., Serratia marcescens, Citrobacter spp., anaerobic bacterial spp, fungi and yeasts.

Etiology

Pathogen causing mastitis are further divided into:

- Major pathogens (those that cause clinical mastitis)
- Minor pathogens (those that normally cause subclinical mastitis and less frequently cause clinical mastitis).

Major Pathogens:

- Contagious pathogens (S. agalactiae, S .aureus, M. bovis)
- Environmental pathogens:
  - Streptococcus SPP. Include S. ubris and S. dysgalactiae- most prevalent
  - S.equinus- less prevalent.
  - The environmental coliforms include E. coli, Klebsiella spp., and enterobacter spp.
  - A. pyogenes- important in some herds.

Etiology

Minor pathogens:

- Found colonizing the teat streak canal and mammary gland.
- They include coagulase negative Staphylococcus spp. Such as S. hyicus and S.chromogenes.
- Staphylococcus wameri, S. simulans, and S. epidermidis are part of the normal flora of the teat skin (teat skin opportunistic pathogens).
- C. bovis is also a minor pathogen.

Uncommon mastitis pathogens

Many other bacteria can cause severe mastitis, which is usually sporadic and affects only one cow or few cows in the herd. These include:

- Nocardia asteroids, Nocardia brasiliensis and Nocardia farcinica, Histophilus somni, Pasteurella multocida, mannheimia haemolytica, campylobacter jejuni, B. cereus and Other gram negative bacteria including Citrobacter spp.
- Enterococcus faecalis, Enterococcus faecium, Proteus spp., P. aeruhinosa, and Serratia spp.
- Anaerobic bacteria such as Peptostreptococcus indolicus, prevotella melaninogenica, Eubacterium combesii, Clostridium sporogenes and Fusobacterium necrophorum.
- Fungal infection include eg. Trichosporon spp., Aspergilfumigatus, etc.
- Yeast infection include eg. Candida spp., Cryptococcus neoformans, etc.
- Algal infection include eg.Prototheca trispora, etc.
- Some viruses may also cause mastitis.

Epidemiology

- Incidence of clinical mastitis ranges from 10-12% per 100 cows at risk per year.
- Prevalence of intramammary infection is about 50% of cows and 10-25% of quarters.
- Contagious pathogens are transmitted at time of milking.
- Teat skin opportunistic pathogens take any opportunity to induce mastitis.
- Environmental pathogens are from the environment and induce mastitis between milkings.
- Environmental pathogens are the most common cause of clinical mastitis in herds that have controlled contagious pathogens.

Epidemiology

- Prevalence of infection with contagious pathogens ranges from 7-40% of cows and 6-35% of quarters.
- Prevalence of infection with environmental pathogens:
  - Coliforms 1-2% of quarters
  - Streptococci less than 5%
- The cause of mastitis involves a complex relationship of three major factors:
  - Host resistance,
  - Microbial agent, and
  - The environment.

Risk factors

Animal risk factors:

- Host characteristics are important risk determinants in the pathogenesis of mastitis.
- These factors are associated with development of specific immunity and with nonspecific host defence mechanism (General resistance).
  - The general resistance related to genetic predisposition, anatomical characteristics of the teat and udder, teat end lesion, nutritional status, stage of lactation, parity, and use of management procedures to enhance resistance.
- Prevalence of infection increases with age.
- Most new infections occur in dry period and in early lactation.
- Highest rate of clinical disease occurs in herds with low somatic cell counts.
- Morphology and physical condition of teat are risk factors.
- Selenium and vitamin E status influence clinical mastitis incidence.
- High producing cows are more susceptible.

Risk factors

Environmental risk factors:

- Poor quality management of housing and bedding increases infection rate and incidence of clinical mastitis due to environmental pathogens.

Pathogenic risk factors:

- Ability to survive in environment,
- virulence factors (colonizing ability, toxin production), and
- Susceptibility to antimicrobial agents.

❖Economics: subclinical mastitis is a major cause of economic loss due to loss of milk production, costs of treatment and early culling.

Screening test for detecting mastitis

- Appropriate implementation of a mastitis screening test into an udder health management program depends on an understanding of the characteristics of the test.
- Tests that commonly employed for mastitis screening purpose include:
- Milk bacteriology: Milk culture is an important means to determine udder health status.
- Somatic cell count (SCC): The counting of somatic cell excreted in the milk has become a widely used indirect measure of mastitis.
  - The SCC has been used as a screening test for subclinical mastitis.
  - Intramammary infection has a greater effect on SCC.
  - The practical use of SCC data to determine cow infection status requires the selection of a threshold level. Eg 200, 000 cells/ml of milk.
- California mastitis test (CMT): it is a useful mastitis screening test.
- Because the vast majority of mastitis is subclinical, there is a great need for the diagnostic screening tests to monitor the prevalence and incidence of IMI in an udder health management program.

Mastitis control

- The production of a high quality milk is a goal of the dairy industry and a motivator for a mastitis control program in a dairy herd.
- The control effort can be successful by using management techniques that limit the spread of major mastitis pathogens, thereby reducing the quarter infection rate.
- Herds that have successfully implemented a mastitis control program also need to develop strategies to control infection with the environmental organisms.
- Mastitis causes greater economic loss.
- The losses are related to:
  - Milk production loss,
  - Low milk quality and low price,
  - Rarely death of a cow,
  - Discarded milk following treatment with antimicrobials,
  - Treatment cost,
  - Premature culling of cows,

Mastitis control

Principle of control:

- Eliminate existing infections
- Prevent new infections
- Monitor udder health status

Components of mastitis control program:

- Establish goals for udder health.
- Use proper milking procedures.
- Maintain a clean and comfortable environment for cows.
- Proper installation, function, and maintenance of milking equipment.
- Appropriate therapy of mastitis during lactation
- Provide effective dry cow management.
- Maintain biosecurity for contagious pathogens and cull chronically infected cows.
- Keep good records.
- Regularly monitor udder health status.
- Periodically review the mastitis control program.

Contagious mastitis control programs

- The contagious pathogens of primary concern in most dairies are *Str. Agalactiae* and *S. aureus*.
- They are the predominant intramammary pathogens in herds with identified subclinical mastitis problem.
- *Str. agalactiae* is essentially an obligate udder pathogen. It spreads from cow to cow during milking and infections become chronic and remain for the most part in a subclinical state.
- For both *Str. Agalactiae* and *S. aureus,* prevention of new infections must focus on milking procedures.
- To reduce the prevalence of infection in a herd we need to achieve three fundamental goals:
  - Prevent new infections,
  - Eliminate existing infections, and
  - Monitor progress after implementation

Contagious mast....

- **Prevention of new infections**
- Postmilking teat dipping with the germicidal solutions:
  - It is an effective milking management practice to reduce the rate of new intramammary infection
- Premilking hygiene and udder preparation:
  - The major objective of premilking udder preparation and teat sanitation is to reduce the microbial population at the teat end.
  - Washing and drying of udders and the use of separate paper towels before milking are frequently practiced in a herd.
  - Premilking teat disinfection with iodine-based teat dip preparations.
- Milking equipment attachment and use:
  - A majority of milking machine-induced intramammary infections occur near the end of milking.
  - To avoid infection proper attachment and use of the machine is very important.

Prevention of new infections.....

- Establishing milking order and segregation programs:
  - In herds with a significant prevalence of contagious pathogens, establishing a specific milking order may be helpful to limit the rate of new infections.
  - First –lactation heifers and fresh cows should be milked first.
  - Cows with a high SCC, chronic clinical mastitis, and current clinical cases should be milked last.
  - Segregation is not a simple, single solution to contagious mastitis problems.
- Sanitize teat liners:
  - Disinfection of the milking machine teat cup liners between cows has the potential of limiting the spread of contagious organisms from cow to cow.
- vaccination
- Proper installation, function, use, and maintenance of milking equipment.

Elimination of contagious intramammary infections

- Elimination of IMI during lactation:
  - All the culture positive cows in a herd should be treated with antimicrobials.
- Elimination of IMI during the dry period:
  - The objective of udder health management during the dry period is to have as few infected quarters as possible at calving.
  - Dry cow therapy is the most effective and widely used mastitis control methods for dry cows.
  - The major benefits of dry cow therapy are prevention of new IMI during the dry period and elimination of existing IMI.
- Elimination of infections by culling:
  - Culling may be the most effective method of decreasing the prevalence of chronically infected cows.

Mycoplasma mastitis:

- Caused by mycoplasma bovis.
- As with other contagious pathogens, the primary reservoir of infection is infected cows and subsequent exposure to in the milking equipment.

Environmental mastitis control

- The predominant cause of clinical mastitis in the high SCC herds is *Str. agalactiae* and *S. aureus.*
- The predominant cause of clinical mastitis in the low SCC herds are coliforms and streptococcal pathogens other than agalactiae.
- Coliform is a general term that refers to lactose fermenting rods of the family *Enterobacteriacea*.
- This group includes the genera *Escherichia, Klebsiella*, and *Enterobacter*.
- The other major groups of pathogens that frequently cause clinical mastitis are the streptococci, excluding Str. agalactiae, and Staphylococci.
- Str. uberis and Str. dysgalactiae are the two most common streptococcal isolates, although numerous other streptococci and closely related enterococci identified as causative agents.
- Environmental pathogens are ubiquitous but are particularly numerous in bedding and manure.

Environmental mastitis control.....

- Sawdust bedding is incriminated as a factor in increased incidence of coliform mastitis, and straw bedding as a factor for streptococci.
- The periparturient period, warm humid seasons, and increasing age are potential risks for increased incidence.
- **Reduced exposure:** the goal of every dairy farm should be to expose the teat of a cow to as few bacteria as possible.
- **Enhanced resistance**:
  - Increased incidence of diseases such as hypocalcemia, ketosis, and displaced abomasum are associated with increased incidence of clinical mastitis.
  - Poorly managed nutrition of dry cows, prepartum cows, and cows in the first 60 days of lactation can adversely affect udder health.
  - Core antigen vaccination might help in enhancing mammary resistance for coliform IMI.

Environmental mastitis control.....

- **Therapy of clinical mastitis**:
  - B/n 30% to 35% of bacteriologic cultures of milk samples from cows with clinical mastitis are negative.
  - Many mild mastitis cases are coliform IMI that are resolved before treatment is necessary.
  - A high proportion of clinical cases observed during the first 60 days after calving , particularly those caused by gram positive cocci, are manifestations of infections that started during the dry period.
  - Chronic IMI often displays recurring episodes of clinical mastitis at regular interval.

Therapy of clinical mastitis.....

- Antimicrobial treatment lead to better clinical cure rates for cases caused by pathogens other than streptococci and coliforms.
- It is rarely efficacious or profitable to administer therapy to milder clinical cases that are chronic and recur repeatedly.
- Therapeutic intervention in coliform mastitis cases should be targeted at reducing the effects of inflammation rather than antimicrobial action.
- Administration of fluids and effective anti-inflammatory agents are more important than antibiotic therapy.
- Occasionally, coliform infections do cause sever chronic mastitis, in this case systemic antimicrobial therapy is important.
- Mastitis cannot be eradicated from a dairy farm, but it can be reduced to an acceptable level of economic losses.

Dairy farming in the tropics

Objectives:

At the end of this lesson you will be able to:

- Describe the basic features of dairy farming in tropics
- Identify the constraints of dairy farms in the tropics

Dairy farming in the Tropics

Brief introduction to tropical dairy farming

- Tropical dairy small holdings take many forms ranging from very small farms with less than 5 milking cows to larger operations with say 30 milking cows.
  - these could be all owned by the one farmer or constitute a colony farm with many farmers owning small herds.
- The dairy industries in many tropical countries do not produce enough milk for the countries to be self- sufficient in raw milk.
- Many such countries have government supported programs to increase domestic milk production.

Brief introduction to tropical dairy farming

- The average herd sizes of these farms is often less than 10 milking cows and the poorly resourced farmers have great difficulty providing sufficient feed for their dairy stock.
- Other constraints to farm production include:
  - adverse weather conditions (high ambient temperatures and humidities),
  - the many livestock diseases and
  - the farmers' poor understanding of the high management requirements of dairy stock.
- The milk yield of tropical dairy farms can be increased by improving feeding and other management practices.
- There are many features of dairy farms in the tropics that influence productivity and profitability as well as sustainability of a dairy farming enterprise.

Types of dairy farms in the tropics

Dairy farms in the tropics can be categorised into **three types**, based on herd size:

- Type 1: Mixed farms
- Type 2: Smallholder dairy farms
- Type 3: Large-scale dairy farms

Types of dairy farms in the tropics

Type 1: mixed farms

- Milk production only makes up small part of farm income.
- Farms evolve from cropping to livestock
- Herd sizes are small, say <5 to 20 cows

Type 2: small holder dairy farms

- Milk production is a major contributor to farm income
- Dairy facilities have evolved but not sufficient for future development.
- Herd sizes are generally smaller than 5 cows.

Type 3: large scale dairy farming

- These have been established primarily to produce milk
- They often need sufficient land or forage supplies.
- Herd size: 20 to 100+ cows

Most countries have mainly type 1 and type 2 farms

What are the constraints to tropical dairy farming ?

The major **environmental constraints** include:

- High temperature and humidity,
- Lengthy dry season, thus shortening the length of the growing season (rainy season).

The major **production constraints** include the following:

- High-yielding dairy cows are essentially temperate animals
- They have high feed requirement and high internal heat production
- Dairy animals are usually fed on crop residue based diet
- Tropical forages generally have low feeding value
- Diseases thrive in tropical climates
- Young stock are highly susceptible to poor management practices
- Farmers often do not fully understand farm management requirements for milk production compared with other types of livestock enterprises

Problems for smallholder dairy farms

- Smallholder dairy farms face many problems.
- The problem can be categorised into three types:
  - Resource problems
  - Skill problems
  - Miscellaneous problems

Problems for smallholder dairy farms

Resource problems include:

- Limited capital and government support
- Limited availability of quality fodder seeds
- Limited land to grow forages
- Lack of “ weather-proof” facilities to house dairy stock
- Inability to source quality dairy stock
- Limited supplies of quality supplements
- Suboptimal infrastructure

Problems for smallholder dairy farms

Problems with skill include:

- A general lack of comprehension and knowledge.
- Misunderstandings that dairy farming is very different to other livestock enterprises.
- Limited understanding of the high nutrient requirements of milking cows.
- Limited understanding of farm business management.

Problems for smallholder dairy farms

Miscellaneous problems

There are a wide variety of miscellaneous problems:

- Farms are small size hence only generate small cash flow.
- Feeding imbalances due to too much concern for genetic merit.
- Lack of quality forage production during dry season.
- There are poor quality assurance schemes for by products and concentrate formulations.
- Milk harvesting system always limit milk quality.
- Dairy advisers often not available and understand little of economics of balanced feeding.

Animal health scheme and production

Objectives:

At the end of this lesson you will be able to:

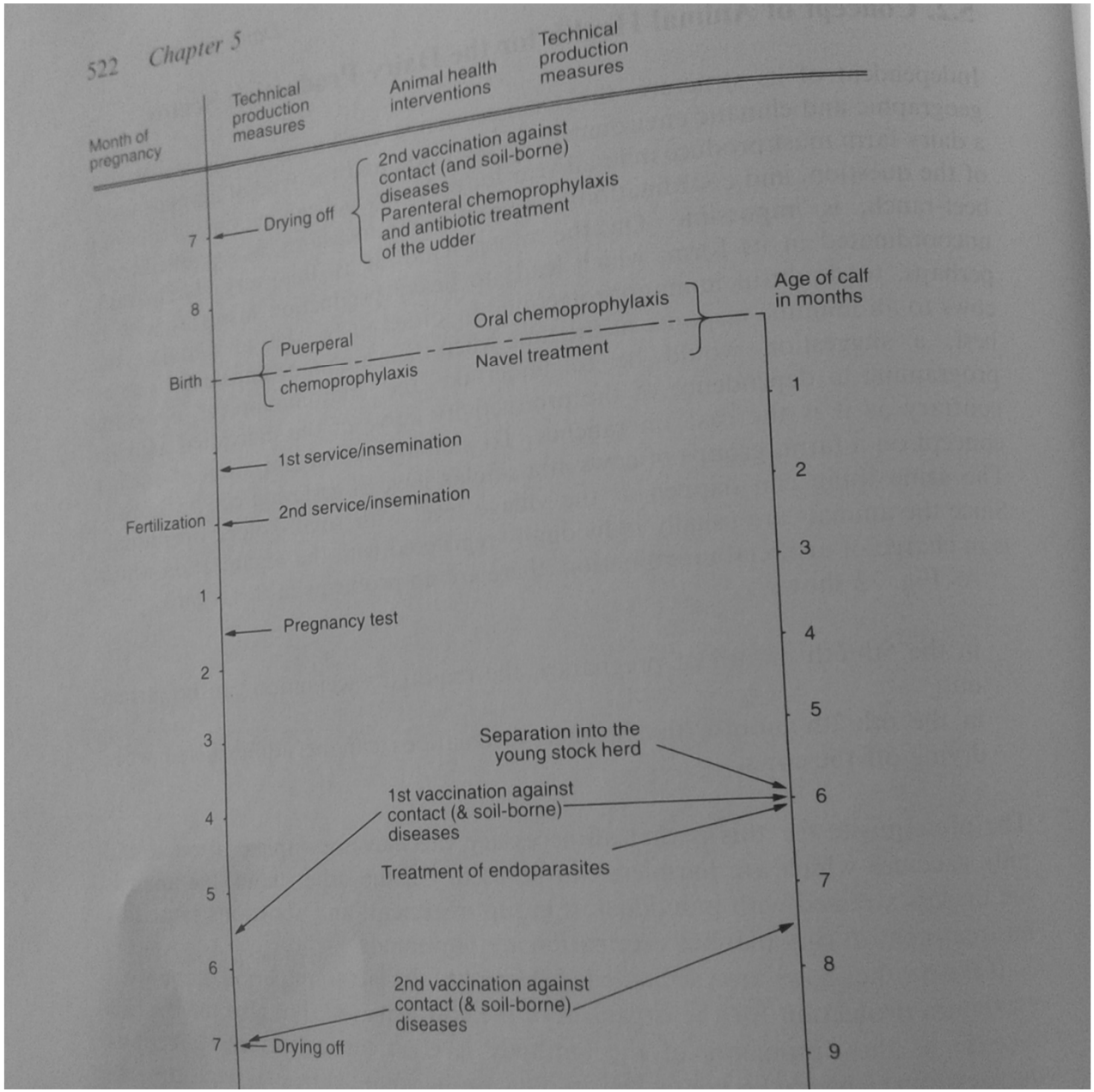
- Formulate animal health scheme for dairy production
- Prevent and control diseases in dairy production

Animal health scheme and production

- The coordination of a health programme is important to provide/get the animal health services effectively, for example for vaccination.
- To simplify the organization on a farm, groups of cows at similar stage of gestation can be formed.
- The same thing can be done at the village level with small-holder operations.
- The required vaccination can be carried out in the 5^{th}/6^{th} month of pregnancy (as indicate in the next figure).
- In the 6^{th}/7^{th} month, a booster vaccination can be administered when drying of the cows.
- The prerequisite for this is that all the necessary vaccines are applied at once.
- Animals are far less stressed with individual or group treatment and abortion caused by mistreatment during blanket vaccination are prevented.

Animal health scheme and production

- Vaccinating the mother cows at the end of the lactation period has two advantage:
  - It provides maximum protection for the organism of the cow.
  - It also provide maximum protection for the calf by optimizing the antibody level in the colostrum.
- Infectious diseases must always be controlled.
  - In the case of young animals through the immunization of the mother.
  - The calves may only be actively immunized when the passive immunity has subsided.
  - This does not take place as a rule until the calves are 6 months of age.


Month of pregnancy
Technical production measures
Animal health interventions
Technical production measures
Drying off
2nd vaccination against contact (and soil-borne) diseases
Parenteral chemoprophylaxis and antibiotic treatment of the udder
Age of calf in months
Oral chemoprophylaxis
Puerperal chemoprophylaxis
Navel treatment
Birth
1st service/insemination
2nd service/insemination
Fertilization
Pregnancy test
Separation into the young stock herd
1st vaccination against contact (& soil-borne) diseases
Treatment of endoparasites
2nd vaccination against contact (& soil-borne) diseases
Drying off
7
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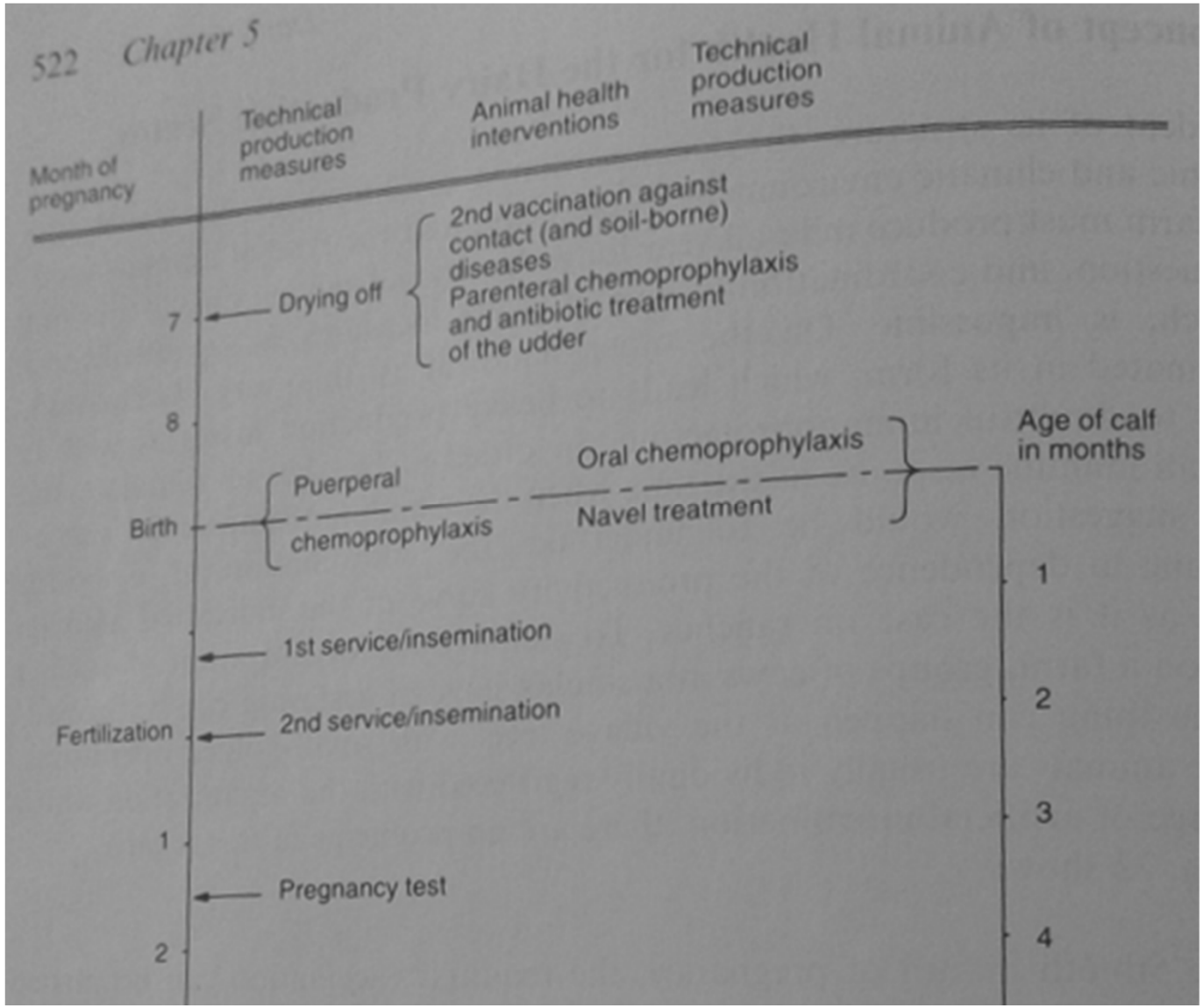
Month of pregnancy
Technical production measures
Animal health interventions
Technical production measures
7
Drying off
2nd vaccination against contact (and soil-borne) diseases
Parenteral chemoprophylaxis and antibiotic treatment of the udder
8
Age of calf in months
Oral chemoprophylaxis
Puerperal
Birth
chemoprophylaxis
Navel treatment
1
1st service/insemination
2
Fertilization
2nd service/insemination
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Pregnancy test
4
2

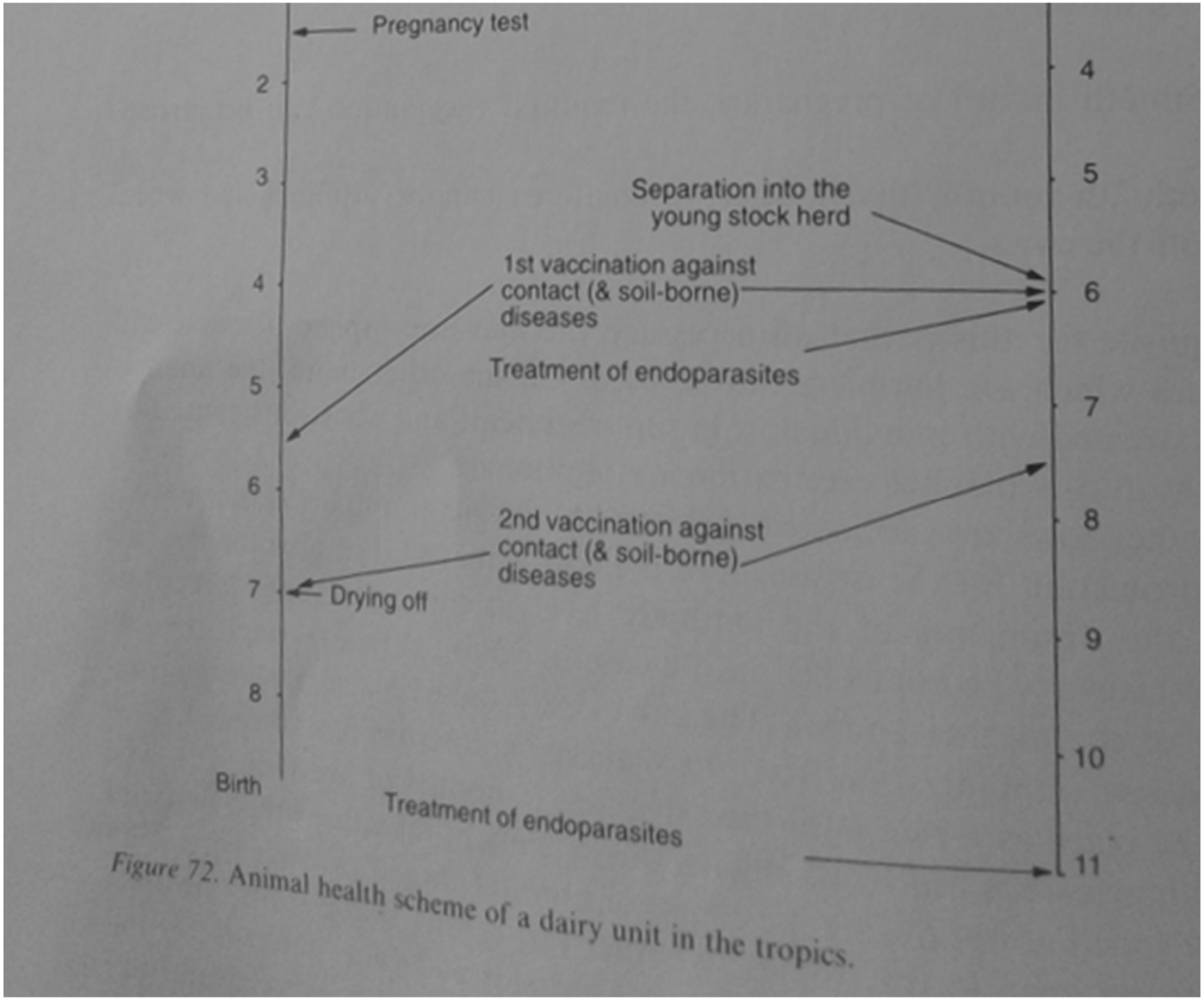

Figure 72. Animal health scheme of a dairy unit in the tropics.

The health management program

- The goal of health management programs is to:
  - ensure the optimal care and well-being of the dairy animals and
  - reduce losses in productivity caused by disease and management errors.
- The health management program is usually developed based on comparison of herd performance with the pre-set performance goals.
- The structure of health management programs is generally unique to each farm.
- The structure of health management programs is minimally composed of:
  - scheduled herd visits,
  - herd performance records review, and
  - decisions and actions related to specific herd management issues.

Management of dairy calves

Objectives:

At the end of this session you will be able to:

- Manage the health and production of dairy calves
- Identify the common causes of calf morbidity and Mortality
- Control and prevent infectious diseases of dairy calves

Health and production managements in dairy calves

- The successful raring of dairy calves from birth to weaning depends on a well managed combination of:
  - A healthy dam that calves without difficulty,
  - A clean calving area,
  - The early ingestion of good quality colostrum,
  - Clean, dry and draft free housing, and
  - Adequate nutrition following colostrial feeding period up to the time of weaning.
- Calf morbidity and mortality are potential problems in all cattle productions.
- Most illness and death occur in the first few weeks of life due to:
  - Effects of infectious pressure,
  - Lack of sufficient colostrial immunity,
  - Inadequate housing, health care, and nutrition or
  - The effect of adverse environmental conditions.

Health management of Dairy calves

- Digestive and respiratory tract infectious diseases are the most important disease for calves.
- About 75% of calf mortality occurs during the first months of life.
- Therefore this indicate the necessity of giving high priority to health management during the first month of calf life.

Common causes of calf morbidity and Mortality

Calf Morbidity and Mortality

Dairy calves morbidity data is not reliable because of the owners tendency not to record every illness event and it depends on the owners clinical diagnosis.

- The best data available for morbidity are based on treatment rates.
  - Before weaning up to 20% of live-born calves can be treated for diarrhea and 15% for pneumonia.
- One study in New York state indicate:
  - A crude incidence of 9.9% for diarrhea with in 14 days of birth and 5.2% from 15 to 90 days.
  - Respiratory illness = 7.4%
- Calf mortality rates from birth to weaning vary from about 1% to 30% and even higher.
- Disease is the largest cause of mortality in calves, and diarrhea and pneumonia are the major causes.
- A study in Canada, Alberta, indicate that 60 % of all calf deaths occurred at birth, 16% with in the first week of life, 21% after one week but before weaning, and 3.3% after weaning.
- In USA, Minnesota, enteritis and pneumonia are the most cause of death in calves.
- In Kenya, gastroenteritis, pneumonia, and tick-born disease are the major causes of dairy cattle mortality.

Calf Morbidity and Mortality.....

In Ethiopia:

- An overall crude morbidity of 62% and crude mortality of 22% were reported in Ada'a Liben (Wudu et al., 2007).
- The most frequent disease syndrome reported in this study include calf diarrhea with the incidence of 39% followed by joint ill 6%.
- The other disease conditions/syndromes diagnosed include navel ill, pneumonia, septicemic conditions, congenital problems and miscellaneous cases.
- Age at first colostrum ingestion and cleanness of the calf barns significantly influence morbidity and mortality.
- Higher crude morbidity and mortality were observed in calves that ingested their first colostrum meal later than 6 hours of age.
- Calves housed in unclean barns were at higher risk of morbidity than calves housed in clean barns.

Acute infectious diarrhoea

- Diarrhoea in newborn farm animals, particularly calves under 30 days of age is one of the most common diseases complexes that frequently encountered.
- It is a significant cause of economic loss in cattle herds.
- The cause of calf diarrhoea are complex and usually involve an interaction between enteropathogenic bacteria, viruses, and protozoa, the colostral immunity of the animal and the effects of the environment.

Acute infectious diarrhoea

- Acute diarrhea accounts about 75% of the mortality of dairy calves under 3 weeks of age.
- The most important pathogens associated with acute diarrhea are:
  - Enterotoxigenic eschericia coli under 3-5 days of age,
  - Rotavirus, in calves 7 to 10 days of age,
  - Coronavirus in calves 7 to 15 days of age,
  - Cryptosporidia sp. In calves 15 to 35 days of age,
  - Salmonella sp., usually in calves several weeks of age, and
  - Cocicidiosis (Eimeria sp.) in calves older than 3 weeks of age.

Acute infectious diarrhoea

- It is characterized clinically by acute profuse watery diarrhoea, progressive dehydration and acidosis and death in few days.
- The disease is considered to be a complex syndrome because of the involvement of one or more causative agent.

Clinical management of epidemics

- When an epidemic of acute diarrhoea occurred the following measures should be implement to manage it.
  - Visit the herd and do an epidemiological investigation to identify the risk factors.
  - Each of the identified risk factors must be examined for its role in the outbreak.
  - Affected calves should be examined clinically, dead ones by necropsy to insure that diarrhoea is the major problem.
  - Affected calves should be identified, isolated and treated with oral and parenteral fluid therapy.
  - Antibacterials may be given orally and parenterally for the treatment of enteric and septicemic colibacillosis.
  - Faecal samples should be collected for laboratory identification of the causative agents.
  - Pregnant cows that are due to calve shortly should be moved to a new uncontaminated calving area.
  - Apply appropriate control strategy.
  - Outline specific recommendations for clinical management of affected calves and for control of the disease in the future.

Principles of control and prevention of infectious diseases of dairy calves

- Dairy calf mortality can be minimized by a stringent comprehensive management program.
- Most common diseases of dairy calves under 1 months of age cannot be prevented totally.
- The most common diseases of calves under 2 months of age are infectious diseases of the digestive and respiratory tract.
- Diarrhea complex is the most common cause of preweaned calf death, followed by respiratory problems.
- A calf herd health program that consider the prevalent diseases in the herd should be implemented based on the following principles:
  - Reduction of the degree of exposure of calves to infectious agents,
  - Maintenance of high level of nonspecific resistance, and
  - Increasing specific resistance of the newborn calf by vaccination of pregnant dam.

Reduction of the degree of exposure of calves to infectious agents

- Infections of calves may occur congenitally or be acquired postnatally.
- From birth to about 6 months of age, the calf is exposed to different infection pressures.
- Strategies to control congenital infection should include culling of infected reservoir animals and minimize the introduction of infected replacement into the herd.
- The reduction of the degree of exposure to infectious agents begins with the birth of the calf, which should take place in a clean environment.
  - The perineum and udder of dirty cows should be washed shortly before calving.
  - The umbilicus of the calf may be swabbed with 2% iodin tincture or tied off with nylon thread immediately after birth to control pathogen entry.
  - Calves affected with diarrhea should be removed from the main calf nursery and treated in isolation.
  - Regular sanitation and hygiene are of paramount importance in the calf nursery.

Maintenance of high level of nonspecific resistance

- The maintenance of high level of nonspecific resistance is dependent on:
  - the ingestion of adequate quantities of colostrum within a few hours after birth and
  - The management and nutrition of the calves.

Management of newborn dairy calves

- The nonspecific resistance of newborn calf is markedly influenced by the type of housing, the temperature of the calving facilities, the temperature of the calf barn, the person caring for the calves, and whether attendance assistance are provided at birth.
- Calves should be retained on the home farm for 2 to 3 weeks before being transported/moved.
- The management system must consider that, during the first 10 days to 2 weeks of life, the calf is extremely susceptible to:
  - The effect of stress,
  - Irregular feeding practices, and
  - Rough handling

Colostrum

- Many infectious diseases of the newborn calf can be controlled by management interventions to decrease the percentage of hypogammaglobulinemia in calves.
- Adequate provision of immunoglobulin mass in the colostral meal and efficient absorption of the colostral immunoglobulin are the two major requirements to protect calves from the risk of infection.
- Ingestion of liberal quantities of colostrum by the newborn calf with in 6 hrs after birth is the first and most important nutritional requirement of the newborn calf.
- control of the amount of colostrum ingested can only be achieved by artificial feeding methods, such as nipple bottle feeders or esophageal tube feeders.
- Time from birth to feeding is a critical factor affecting absorption of colostral immonoglobulins by calves.
- Calves should be assisted to suck their dam within an hour after birth. Absorption of colostral immunoglobulins ceases by 24 hrs after birth.

Colostrum.....

- Effectiveness of passive transfer of colostral immunoglobulins depends on the volume of colostrum ingested, the concentration of immunoglobulin in the colostrum, and the time after birth ingested.
- Only the first milking of colostrum after calving should be considered for feeding to calves for immunoglobulin transfer.

Increasing specific resistance of the newborn calf by vaccination of pregnant dam

- The pregnant cow is vaccinated at 6 and 3 weeks before parturition to stimulate the production of specific antibodies against the common enteropathogens.
  - These antibodies then transferred to the colostrum.
- An adjuvant vaccine containing inactivated rotavirus and corona virus and K99 + E. coli significantly increased the serum antibody level at the time of parturition.
- Vaccination of pregnant cattle with infectious bovine rhinotracheitis (IBR), Salamonella and others is also a successful method of protecting the calves from these diseases.
- A quadrivalent vaccine containing the killed antigens of Bovine respiratory syncytia virus (BRSV), parainfluenza-3 virus, mycoplasma bovis, and M. dispar may provide some protection against respiratory disease associated with these pathogens.

Thank you!