

HERD HEALTH MANAGEMENT AND RECORD KEEPING FOR DAIRY SHEEP

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Introduction

The sheep industry, especially larger commercial flocks, have been looking for more efficient ways to fight against health problems for a long time. Traditional veterinary medicine with healing, curing and treating of single animals or entire flocks has lost its importance and will more and more be replaced by preventive measures and health management.

Reasons that are limiting the use of traditional veterinary medicine:

- Quite a lot of infectious diseases in sheep have an epidemic course (e.g. Pasteurella pneumonia, coccidiosis) and are spreading very fast and aggressively (e.g. chlamydiosis, pneumococcosis in lambs) within a flock. Also non-infectious problems (e.g. copper poisoning, white muscle disease) involve more often several animals or even the whole herd;
- Some diseases in small ruminants (e.g. enterotoxemia, sudden death) can't be treated or cured;
- Low income per animal unit and modest value of the animal itself ;
- High animal numbers per farm are making conventional medical practice too expensive (chlamydiosis) and too labour intensive (e.g. infectious footrot);
- Lack of registered drugs for use in sheep;
- It's well known that the percentage of bacteria and parasites (internal and external) with single or multiple resistance against regular drugs is steadily growing. The more often and uncontrolled these drugs are used, the greater is the chance that resistance will grow.

Good herd health management helps to prevent the development and/or uncontrolled spread of disease and reduces economical losses. It is even more important in a dairy sheep operation than it already is in a common meat sheep flock.

Key reasons for the importance of herd health management in dairy sheep operations:

- **Health risks for humans**

Milk and milk products are an extremely volatile food. Several infectious diseases (e.g. listeriosis, staphylococcosis) can be spread easily via milk or milk products to consumers. Health risk can occur even when the milk was pasteurized (e.g. Staphylococcus aureus toxins). Sheep's milk with its high protein and fat content is especially prone to hazardous problems.

- **Inefficient milk performance and economy of enterprise**

Herd health problems have a direct (e.g. mastitis) or often an indirect (e.g. footrot, enzootic pneumonia, OPP) impact on the milk performance and are, besides primary feeding failures, the most common reasons for reduced milk performance and economical losses.

- **Increased susceptibility to health problems**

Dairy sheep are more susceptible to a variety of health problems than meat sheep (e.g. Pasteurella pneumonia in East Friesian sheep). Additional stress factors (such as early weaning of lambs, milking procedure, performance stress, a.s.o.) have a negative effect on the immunity system.

In dairy flocks infectious diseases (e.g. OPP) often spread faster, evoke more severe clinical signs and result in more excessive economical losses.

• **Milk withdrawal time**

Most of the drugs that exist to cure and heal lactating dairy cows are not registered for use in dairy sheep. This means that they either can't be used or they have a very long milk withdrawal time, which results sometimes in big financial losses and additional labour, because treated animals have to be milked seperately.

Health problems

This paper will not include a complete review of all herd health problems in dairy sheep. It represents a selection of problems from the prospective of a dairy sheep producer and veterinarian. The herd health depends on many different circumstances as geography, type of management system (extensive, intensive), herd size, farm size, housing, feeding, a.s.o.

General problems

Problem Biosecurity

A really big threat to the health of every sheep flock is the [uncontrolled] traffic (e.g. purchase, breeding, pasture contacts, shows, exhibitions) of sheep or related ruminants (especially goats) and humans (e.g. farmer himself [sales barn visits], custom workers, visitors).

Problem management & animal environment

Many diseases and health problems that can occur in a flock are based on a faulty or incorrect:

- Sheep *environment* (*space, climate, bedding, light*: keeping conditions)
- *Feeding*
- *Handling*
- *Care*

Let us call these four subjects 'basic needs' of sheep. When any defects in the accomplishment of these basic needs exist over a long time period, then health problems will develop and worsen the longer these defects will exist.

Table 1: 'Basic needs' of sheep, which have to be satisfied by the management:

'Basic needs'	Common failures	Normal
Environmental conditions –Space –Climate: . Air quality & movement . Humidity . Temperature –Bedding & walk ways –Light	Too tight, crowding –Draft or sticky, with accumulation of noxious gases –Over 80 % for a longer time –Too cold or too warm None, wet, dirty, foul, muddy Too dark (often in old barns)	Comply with codes ⇒ better cold and dry, than warm and too humid Dry, clean, sufficient 'News-paper'-test

'Basic needs'	Common failures	Normal
Feeding	<ul style="list-style-type: none"> • Not balanced and not according to performance: <ul style="list-style-type: none"> - Energy ↑↑ and protein ↑↑ - Energy ↑↑ and protein ↓↓ - Protein ↑↑ and energy ↓↓ • Not enough fiber in ration • Too monotonous • Feeding time too short • Spoiled feed • Not enough minerals, trace minerals, vitamins • Not enough feed trough width for all • No or not enough water, bad quality 	<ul style="list-style-type: none"> • Well-balanced and according to performance (3 phases: starting phase, producing phase, high pregnancy & preparation phase) • Always supply roughage, even during summer • Variety of feed • Long feeding times (over 6 hours) • Clean, without mold, dust-free • Well balanced mineral salts <u>and</u> NaCl-salt- [blocks], check intake, keep clean! • Provide enough feed trough space • Free access to clean water, check & clean waterers regularly
Handling	No handling facilities: stress, injuries	Well considered handling: no need of fancy equipment and facilities
Care	Neglecting foot trimming, shearing	Foot trimming 1-2 x per year, shearing in minimum once per year (East Friesian: 1-2 x)

↑↑ = too much ↓↓ = not enough

Specific health problems

- **Infectious diseases:**

a) *Contagious diseases:*

Of major interest are diseases which can be easily spread from flock to flock. A special concern for every sheep enterprise are those contagious diseases that can't be cured (or rarely) and where no sanitation is possible:

Table 2: Listing of some important contagious diseases:

Disease	Treatment	Sanitation	Preventive Measures
Footrot	Possible	Labour intensive, improved management	Closed flock, vaccination
OPP (Maedi-Visna)	Impossible	Complex, artificial rearing of lambs	Closed flock, test
Adenomatosis	Impossible	Unknown	Closed flock
Scrapie (*)	Impossible	Culling	Closed flock, test
Paratuberculosis	Impossible	Impossible or unknown	Closed flock, test
Pseudotuberculosis *	Impossible	Complex, artificial rearing of lambs	Closed flock, test, vaccination
'Chronic mastitis' *	Possible	Sometimes complex, improved management	Closed flock, CMT
Chlamydiosis *	(+/-) possible	Complex, vaccination	Closed flock, test, vaccination
Ecthymia *	Possible	Labour intensive, vaccination	Closed flock, vaccination
Pasteurella pneumonia	Possible	Improved management	Closed flock

* Zoonoses (Diseases with a potential to affect both man and animals)

b) Low (or not) contagious diseases:

Some infectious diseases can occur within a flock without having contact with other herds. These diseases can have a great negative impact on the herd health, especially when there is no treatment or cure possible, but in general they are easier to prevent.

Table 3: Listing of some unimportant or low contagious diseases:

Disease	Treatment	Sanitation	Preventive Measures
Enterotoxemia	Impossible	Improved management, vaccination	Vaccination
Listeriosis*	Impossible	Improved management, 'vaccination'	Improved management
Tetanus	Impossible	Improved management, vaccination	Vaccination, disinfection

* Zoonoses (Diseases with a potential to affect both man and animals)

- **Parasitic diseases**

External and internal parasites can be administered into a flock with the purchase or introducing of other sheep into the flock. Under certain conditions wild animals can be involved. Some internal parasites are very difficult to prevent, because they have hosts, where the parasite can pass the winter (e.g. *Moniezia expansa* [sheep tape worm]).

- **Other diseases**

Nutritional and Metabolic diseases (See Table 1 [feeding]):

Feeding disorders are quite common in dairy sheep. The lactation length (up to 300 days) and performance stress are much longer and more intensive than in meat sheep, therefore, feeding failures become especially problematic.

Table 4: Most common feeding disorders and their prevention:

Disease	Cause	Prevention
Pregnancy toxemia, ketosis	–Direct: Undernutrition (energy ↓↓), or overnutrition (energy ↑↑) –Indirect: Multiple fetuses, indigestion, rumen acidosis	Body scoring in early gestation, feeding balanced and according to performance, grain regularly, good quality roughage, (fetus counting)
Milk fever	–Direct: Too much calcium during late pregnancy, (wrong mineral salt, sugar beets, hay with lots of legumes, alfalfa?) –Indirect: Stress (handling), crowding	–Balanced mineral salt (specific for sheep, not dairy cow salts), grassy hay –Avoid stress in late pregnancy: enough space, optimal handling, enough trough width
Indigestion & Rumen acidosis	Lack of fiber (roughage in ration), too much grain, too fast increasing of grain amount in late gestation	Balanced rations (enough fiber), gradually increasing of quantities of grain (2-4 weeks), roughage feeding before grain, grain and corn silage distribution 3 or more times per day
Milk fat depression	Supplementing of poor quality roughage with concentrate (to boost milk performance)	Balanced rations, good hay quality, feeding of roughage always before grain
Enterotoxemia	Sudden changes in diet (e.g. new pasture, excessive grain feeding)	Avoiding of rapid diet changes: Feeding of hay when grazing 'rich' pastures (spring, seedings), regular feeding of grain (better often in small quantities)

Management Practices

General Measures

A good herd health management should be based on two main principles:

- I. **Biosecurity**
- II. Fulfillment of **basic needs** of sheep

These two principles must always to be met without compromise.

I. Care about biosecurity !

There are at least three possible levels of biosecurity:

A) Minimal preventive measures:

Animal traffic is restricted: Replacement ewes, rams a.s.o. can be brought into the herd after a quarantine of a minimum of 4 weeks. Only 'healthy' animals will be accepted. Attending of shows is possible.

This type of biosecurity is very controversial, because there is no guaranty that these measures can protect a good health standard.

B) Closed flock management

The herd is periodically controlled by clinical check and/or laboratory testing (serology a.s.o). Any animal traffic is strictly forbidden. No showing of sheep. A.I., E.T. Under certain circumstances animals out of herds with the same sanitary status may enter the flock after an obligatory quarantine. Traffic of humans is also restricted: Access to farm only after changing of boots and clothing (overall). The same precautions are necessary after visits of sales-barns, livestock exhibitions and slaughter houses!

Dairy sheep operations should be managed as closed herds. With a modest amount of labour a high level of security can be achieved.

C) Specific pathogen free flock (Hysterectomy, nucleus flock)

This is the most rigorous level of biosecurity. Theoretically all infectious diseases, (also in the moment not known or detectable infectious agents) can be barred from a flock. Needs a very good management to keep and to control the sanitary status. The role of wildlife, birds, rodents and insects in spreading certain diseases is at the moment not always known. In the hog industry quite good experiences could be achieved, but hogs leave the barn environment just for the slaughter house!?

II. Care about the 'basic needs' each creature needs:

Enough space to move
Good climate
Dry and clean bedding & walk ways
Lots of natural illumination
Balanced feeding
Stress free handling
Good care

In herd health management it is of tremendous importance that the basic needs of each sheep can be fulfilled as well as possible. Without the fulfillment of these basic needs any further management measures will be futile. (See also Table 1)

Feeding:

The most common feeding disorders with their preventive measures are listed in Table 4.

Some general remarks regarding feeding management: (See also Table 1)

- Ruminants need over 18 hours for eating, ruminating, chewing!!!: Allow a minimum of 6 hours for eating;
- Sheep are selective eaters, if they have the choice to do so. Grazing of a modest quality pasture or feeding of an average quality hay can result in astonishingly good milk performance;
- Feeding of a variety of food boosts dry matter intake and results in higher performance;
- Sheep feeding should be done according to three performance phases:
 - **Starting** phase (Parturition to end of 2nd month of lactation);
 - **Producing** phase (3rd month of lactation to 3rd month of gestation);
 - **High gestation & preparation** phase (4th and 5th month of gestation).

Each phase is characterized by specific conditions, that have different requirements.

- Dairy sheep in lactation need free access to a water source of good quality.

III. Cull sheep with (repeated) health problems:

Not a main principle, but a quite important tool of herd health management is the culling of sheep which have had (several times) serious health problems. For some health problems it is advisable not to use the offspring as replacement ewes or breeding rams, because susceptibility to many diseases is heritable.

Specific Measures

Measures as described under general should be able to control most of the infectious diseases normally. However some diseases need additional preventive measures:

(1) Infectious diseases:

For dairy sheep the following preventive measures could be taken: (See also Table 2)

a) Birth, new born lambs:

- Dry and clean bedding;
- When help is needed: Only with clean, disinfected hands;
- Navel disinfection with Iodine;
- Check udder and make sure lambs get colostrum.

a) Vaccinations: Especially recommended for dairy sheep are:

- **Enterotoxemia;**
- Tetanus.

b) Mastitis: Mastitis problems are very frustrating and serious. Generally three types of mastitis are known (seeTable 5).

Table 5: Types of mastitis

Type	General	Clinical signs Udder	Milk	CMT	Treatment
Acute Mastitis	Fever, lameness, sick	–Swollen, hard –Hot or cold –Red or blue-black –Dolorous –(Assymetric)	–Dramatically reduced –Altered: water-like, bloody, pus, frazzels	+++	–Antibiotics in udder & systemic –(Dry treatment)
Chronic, clinical M.	No fever, no sick, ev. slight lameness	–Sensitive –(Assymetric)	–Reduced –Slightly altered: water-like, frazzels	+++	–Antibiotics in udder –Dry treatment
Chronic, subclinical M.	Absolutely normal	–Nodes and/or slightly assymetric	–Slightly reduced –Not altered	+ to +++	–Antibiotics in udder –Dry treatment

Chronic, subclinical mastitis is a major concern for the milk processing industry, because the quality of the milk is reduced without being obviously altered, and affected sheep don't normally show any clinical signs. Some pathogen germs can even be a threat for human health (e.g. *Listeria* species). Chronic mastitis does not seldom develop to a herd problem, with several sheep or nearly all affected. The only way to control chronic mastitis is an optimal udder health (preventive) management:

- Milking equipment: (Checks & maintainance)
 - Vacuum (level, fluctuations, leaks, drains)
 - Pulsation frequency
 - Pulsation rates (vacuum phase : rest phase)
 - Teat cup liners, hoses, valves
- Milking techniques & hygiene:
 - Strip into premilk cup, check milk
 - Clean just really dirty udders with paper towels
 - Remove all milk from the udder, but don't 'overmilk'
 - CMT a minimum of once per week
 - Teat dipping after (if necessary also before) milking
 - Tranquil handling
- Parlour & environment:
 - Avoid muddy walk ways and pastures
 - Pre-milking waiting area with good drain, better roofed
 - Access to parlour over grid, slotted floor or hard gravel
 - Dry, clean bedding
- Housing, feeding, handling a.s.o. (See under general preventive measures)

d) *Listeriosis*: *Listeriosis* needs some special remarks, because this disease can be quite dangerous for humans. The main concern are sheep that are affected, but don't show signs of sickness, but spread *Listeria* bacteria in the milk and contamination of milk in dairies with an unsatisfactory hygiene.

Preventive measures are:

- Feeding of good fermented silage (corn and hay) only;
- Remove left-overs of the previous silage feeding from the feed trough. Don't throw these left-overs or other spoiled silage in the sheep pen (for bedding);
- For silage feeding use mainly concrete or steel feeders;
- No milking in the housing barn itself;
- Good parlour hygiene.

d) Disease Monitoring: For some accreditation programs it is necessary to monitor certain diseases (e.g. **OPP**, [Scrapie, Pseudotuberculosis, Paratuberculosis] with different laboratory test (e.g. blood serology)).

(2) Non-infectious diseases: Some remarks:

- Selenium/Vitamin-E deficiency: White-muscle disease in lambs and preventive measures are mostly well known. Selenium/Vitamin-E deficiency might be even more common in a 'chronic', latent form in adult dairy sheep. Possible problems could be: Reduced fertility, negative influence on immunity system and milk performance.
- Copper poisoning: Beware of commercial dairy concentrates! Check mineral salts on copper contents.

(1) Parasitic diseases:

a) Ectoparasites

General preventive measures to control infestation with ectoparasites as **mites**, lice, keds, ticks are:

- Closed-flock management;
- Periodic shearing (East Friesian sheep: if problems 2x);
- Optimal keeping conditions. (See under general measures)

a) Endoparasites

- **General:**

Some of the many different types of endoparasites (e.g. Haemonchus) are a real threat to the herd health. Preventive management is the only reasonable way to control these parasites, but is very complex and depends on the individual existing circumstances of each farm (e.g. pasture or confinement, numbers of pastures, a.s.o.). In dairy sheep there is the additional problem of the availability of registered dewormers. Some dewormers are forbidden for lactating animals and others have a prolonged withdrawal time.

General preventive measures:

- All sheep (also goats) entering the herd (purchase, breeding) should be set under quarantine for three weeks and dewormed at least two times;
- Divide herd into age groups for grazing (adult ewes, weaned lambs): The older the sheep are the less problems they will have with worms (certain immunity). Lambs and sheep in the first grazing season are the most vulnerable. Therefore don't graze weaned lambs with adult ewes;

- Deworm ewes before beginning milking: e.g. directly after lambing, when milk can't be used for human consumption (colostrum) or as long as lambs suckle. Additional dewormings if necessary could be done with 'organic dewormer' (e.g. Diatomaceous Earth, herbal dewormer), that have no milk withdrawal time;
- Use the exact dosage of dewormer (or better too much than not enough: resistance), check accuracy of used equipment, keep newly dewormed sheep inside or in yard for at least a day;
- After grazing a field let the grass regrow and cut it as hay or silage (hay - pasture rotation) or graze this pasture with horses, cows, calves (not goats);
- Fence off manure piles (also run-off areas) and muddy yards;
- If possible monitor parasite infestation with faeces samples;

Record keeping

Record keeping is an important tool of the herd health management because it allows you to monitor the health status. Data analysis helps to track for problems, to show up solutions and to make necessary management decisions.

Besides regular milk performance and prolific data the following health records are essential to observe the herd health status:

Table 6: Recorded data for dairy sheep enterprises:

Data	Kind of data	Reason
Health	Kind of health problem, date	Decision for culling, offspring, preventive measures
Lambing	Date, problems, lambs born	Decision for culling, offspring, preventive measures
Breeding	Date(s)	Information for feeding, management
Vaccinations	Date, drug used, milk/meat withdrawal duration	Information for booster, animal sales, decision for milk/meat use
Foot trimmings	Date	Control
Culling	Date, reason	Decision for offspring, preventive measures
Deworming	Date, drug, doses, milk/ meat withdrawal time	Information for pasture management, decision for milk/ meat use

Table 6: Recorded data for dairy sheep enterprises (continued):

Data	Kind of data	Reason
Other treatments	Date, drug, doses, milk/ meat withdrawal time	Information for management decisions, decision for milk/meat use
Udder health •SSC (CMT and others) •Bacterial analysis •Mastitis treatments	Date, results dito dito	Information for milk quality, decision for milk use, dry-treatment
Milk: (besides performance data) •Butter fat •Protein •Ammonia	Date dito dito	Information for feeding and health
Blood testing (serology) (e.g. OPP)	Date, test reason, kind of test	Health monitoring, accreditation programs, information for animal sale
Other monitoring tests (e.g. Scrapie)	Date, test reason, kind of test	Health monitoring, accreditation programs information for animal sale
Hay & silage quality: •Analysis •Self-estimation	Standard feed data Stage, weather conditions estimated value	Information for feeding
Pasture	Rotation date, quality estimation	Information for feeding

Computer programs:

Larger operations should do record keeping with a computer based program on a regular schedule to avoid the loss of important data.

Two possible sources for programs are available:

- **Individually adapted** or designed standard **programs:** e.g. Excel, MS-Access
- Available **commercial programs:**
 - Different programs for goat dairies (e.g. Goat management software)
 - Specific sheep management programs (e.g. Ewe Byte: Ontario)

Conclusion

Good herd health management is an essential factor for economical and profitable operating of a dairy sheep enterprise. Commercial sheep dairies should be managed as closed herds to minimize disease problems. The fulfillment of all basic needs of the sheep (keeping conditions: space, climate, bedding, light; feeding; handling; care) is very important for the general health and the response of the immune system to diseases.

Record keeping is a significant tool of herd health management. Data analysis of these records helps to track for problems, to show up solutions and to make necessary management decisions.