Farm Animal Services for Veterinary Surgeons

Investigation Modules to support Health Planning and diagnosis

UKAS
TESTING

CATTLE

Barren Cows

The target for the number of cows in calf, for a breeding period of nine weeks, is 95%. Where this target is not reached an analysis of the problem should be carried out. This should cover the following areas:

- Analysis of age of barren cows in relation to the age structure of the herd
- Analysis of the calving dates of the barren cows in the previous calving season in relation to the rest of the herd.
- Comparison of the bulling groups and the bulls should be clinically assessed.
- Assessment of the nutritional management of the dry cows through into the breeding season
- Biosecurity audit

Once that is completed and no obvious or potential explanation found then the following screening tests should be considered:

- 4–6 barren cows and 4–6 pregnant cows should be blood sampled and screened for antibody to BVD and L. hardjo.
- Where the biosecurity audit indicates vaginal mucus should be collected from 12 cows and screened for Campylobacter. (Campylobacter Culture and id package). The mature bulls within the bull stud should be screened by carrying out sheath washing for campylobacter. A sampling protocol is available from your local disease surveillance centre.
- 6–10 cows should be blood sampled and screened for copper.

Abortion/stillbirths

Up to 2% of animals will abort because of non-infectious causes. However it can be difficult to detect abortions particularly those occurring in mid term. Therefore rather than waiting for the abortion rate to exceed 2% before initiating investigation it is recommended that all abortions are considered for examination. The following screening tests are recommended:

- Notification of abortion to the animal health office for possible Brucella screening.
- Submission of foetus and placenta to the vet lab for examination
- 4–6 aborted cows and 4–6 pregnant cows should be blood sampled and screened for antibody to BVD, IBR, Neospora and L. hardjo. (Bovine abortion serology package)
- Where the problem is stillbirth then the investigations below for poor viability in calves is recommended

Poor viability in calves

No more than 1% of calves should die in the first few days of life. Most deaths are related to dystocia and anoxia of the calf. The following investigations are recommended:

- Assess EBVs of bulls in herd in relation to the calves born and problems encountered.
- Condition score dry cows and those that have lost calves
- Submission of foetus and placenta to the vet lab for examination
- 4–6 cows where the calf has died and 4–6 cows with a viable calf should be blood sampled and screened for antibody to BVD, Neospora and L. hardjo (Bovine abortion serology package)
- The ration should be reviewed.
- 4 –6 calves and their dams should be screened for vitamins A and E, GSHPx and copper levels.
- 4 affected calves under 2 weeks of age should be screened for immunoglobulin concentration.

Neonatal enteritis

Calf mortality should not exceed 2% in the period before weaning. The most common cause for this being exceeded is neonatal enteritis. Clinical cases of enteritis where treatment is considered necessary are worthy of investigation.
- Single clinical cases should be screened for Salmonella and cryptosporidia (Basic enteritis package)
- Where a herd problem exists, 4 fresh cases should be screened for rotavirus, coronavirus cryptosporidia and Salmonella (Neonatal enteritis package)
- Where cases are occurring in the first four days of life screening for E coli K99 should additionally be carried out.
- Where cases are occurring in calves older than two weeks screening for coccidia should be carried out.
- 4 cases less than two weeks may be screened for immunoglobulin concentration.

Poor growth rates in calves at grass

Target growth rates depend on the production system, but suckled calves are capable of growing well in excess of 1 kg per day. Lower growth rates can be tolerated in older calves to be finished in the winter. Replacement beef heifers for bulling at 13 to 15 months must achieve life-time growth rates in excess of 0.75 kg per day. Replacement dairy heifers for bulling at 13 to 15 months should achieve growth rates of 0.75-0.80 kg/day when aged 0-8 months and 0.65-0.70 kg/day when aged 8-15 months. Where growth targets are not met then investigation is justified. The following are recommended:
- Clinical examination for signs of disease (particularly pneumonia).
- Measure sward height and assess productivity of sward in terms of species of grass and clover content.
- Review fluke and worm control
- Sample 4 – 10 for Cu, GSHPx and pepsinogen (Bovine ill thrift profile)
- Sample 4 – 10 for worm eggs and lungworm and fluke where the local conditions indicate.

Poor growth rates in housed cattle

Target growth rates are determined by the production system. It is critical to meet the targets that are defined (see 'Poor growth rates in calves at Grass'). Where growth targets are not met then investigation is justified. The following are recommended:
- Clinical examination for signs of disease (particularly pneumonia).
- Review ration
- Review worm control
- Sample 4 – 10 for Cu, GSHPx, GGT and pepsinogen (Bovine ill thrift profile)
- Sample 4 – 10 for fluke where the local conditions or origins of calves indicate. (It is assumed that where an anthelmintic dose around housing has been omitted that the review will identify this and treatment given.)

Endoparasite monitoring programmes

PGE and Lungworm: Refer to "Poor growth rates in calves at grass"

Liver Fluke:
Post mortem examination of casualties.
Check 4-6 animals by fluke egg count and liver enzymes at housing/treatment and 3 weeks (triclabendazole) or 8 weeks later to determine whether the treatment was effective.
Refer also to "Poor growth rates in housed cattle"

Pneumonia in housed calves

Pneumonia is an important cause of mortality and poor growth rates. Prevention programmes are essential. Investigation of pneumonia is essential where there is mortality and where it is of such severity that metaphylaxis is considered and where a problem persists despite implementation of a control programme.

- Post mortem examination of any calf that dies after a short illness
- Sample four acute untreated cases for bacteria (Nasopharyngeal swabs (NPS) in bacterial and mycoplasma transport medium) as metaphylactic treatment is initiated.
- Sample four acute untreated cases by BAL for RSV and Pi3 and by NPS for IBR where indicated. (Note that BAL samples may used for bacteriology.)
- Collect blood from 4 – 6 acute cases for future paired serology in the event that BAL examination does not provide a diagnosis (Bovine respiratory serology package)
- Screen chronic cases for BVD virus
- Where investigation only takes place several weeks after the outbreak has started then 4 to 6 single serology samples can be used to show the agents the calves have been exposed, but will not allow a definitive diagnosis to be reached (Bovine respiratory serology package)

Subfertility in dairy cattle

- Assess records and carry out routine analysis to determine for example if the problems are post partum endometritis, poor oestrus detection, poor conception rate (if so, is this related to lactation number or time after calving?) or poor submission rate. The cause of subfertility is usually multifactorial
- Review farm strategy and building design with reference to oestrus detection. Consider use of detection aids (e.g. KAMAR)
- Assess ration, particularly to dry cows and in early lactation with particular reference to energy, dry matter and long fibre intakes. Assess the bulk milk butterfat and protein levels for the last 3 months to check for possible dietary sources of the problem
- Condition score cows at dry–off, calving and at 6 weeks calved. Greater than 0.5 BCS loss after calving is indicative of significant energy deficiency
- Mini–metabolic profile package on at least six cows 1–3 weeks calved and 6 cows in last 2 weeks of dry period (Bovine mini metabolic profile package)
- Assess against targets, incidence of retained placenta, endometritis, lameness and milk fever
- Assess timing of AI and technique (particularly if DIY AI) and any differences in conception rates between AI technicians and natural service
- Where natural service is used clinically assess the bull (s). If this or the investigation as a whole suggests, investigate bull fertility further
- Carry out biosecurity audit
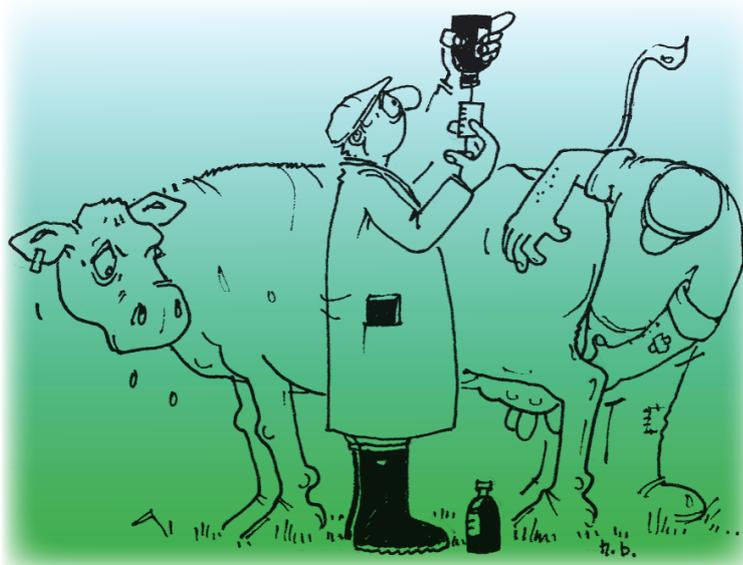
If no obvious or potential explanation found consider infectious disease or copper deficiency. The following screening tests should be considered:
- 4-6 barren cows and 4-6 pregnant cows should be blood sampled and screened for antibody to BVD and L hardjo

- Where natural service is used and the biosecurity audit indicates vaginal mucus should be collected from 12 cows and screened for campylobacter (Campylobacter culture and id package)
- 6–10 cows should be blood sampled and screened for plasma copper

Mastitis in dairy cattle

Clinical mastitis
- Train farmer in aseptic collection of milk samples technique
- Submit aseptically collected milk samples for bacteriology from at least five and preferably 10 clinical cases (Mastitis bacteriology package) or (Full mastitis package)
- Encourage freezing of aseptically collected milk samples from all future clinical cases so that a number of samples are ready for immediate testing should the problem recur

Subclinical mastitis

- Train farmer in aseptic collection of milk samples technique and California mastitis test
- Identify at least 10 cows with persistently elevated somatic cell counts (at least 2 and preferably 3 monthly or fortnightly counts over 300,000 cells/ml) from milk records. Exclude high counts within 2 weeks of dry-off and within 2 weeks after calving
- Identify quarter infected by California mastitis test
- Submit aseptically collected milk samples for bacteriology from infected quarters from at least 10 cows

Lameness in dairy cattle
- Locomotion score the cows quarterly to assess the number of cows that are lame, subclinically lame and walking sound in the herd. This measures the prevalence of lameness
- Examine foot trimmer or farm records to identify the most common cause of lameness and the number of chronically affected cows
- Examine lame cows identified by locomotion scoring to confirm the principal causes of lameness
- Assess walking surfaces inside and outside with regard to roughness of concrete, presence of stones etc.
- Assess cow comfort in the cubicles and number of cows that are lying properly within the

Parameter	Target (%)	Interference (%)
DAIRY COWS		
Clinical mastitis cases /100 cows	20	30
Percentage of herd with ICSCC >200,000 cells/ml	20	25
Failure to conceive culling rate	6	10
100 day (post-calving) in-calf rate	90	80
200 day (post-calving) not in-calf rate	6	10
Retained foetal membranes	2	8
Endometritis	5	15
Cystic ovarian disease	2	5
Lameness prevalence (% of cows lame on a particular day)	10	20
Milk Fever	2	7
Clinical Ketosis	2	5
Abortion/still birth	2	4
CALVES		
Perinatal mortality	1	3
Neonatal mortality	3	5

cubicles (>80% of cows should be using cubicles correctly)
- Assess slurry management and suitability of footbathing regime
- Consider heifer foot trimming, footbathing and management on entry to the herd

SHEEP

Abortion

Target level: <2%

Interference level: 3% or >1 in the space of a week

History: open/closed flock, ewes exhibiting ill health (e.g. fever, pregnancy toxaemia), recent handling, vaccinations, feeding, number affected/number in group, history of agents in flock, indoors/outdoors, ages affected, body condition.

Action:
1. Submit foetuses and placentae from affected cases
2. Blood sample affected ewes (serum sample). Can be stored pending results from testing of abortion material. Test for Toxoplasma, EAE (Ovine abortion serology package) (+/– Border disease, Q fever, TBF)
3. If a diagnosis is not reached after first submission, or abortions continue, submit more abortion material for examination because more than one cause may be present in same season.
4. Properly dispose of any abortion material not submitted. Isolate affected animals for minimum of one month
5. Be aware of the zoonotic potential of many of the pathogens causing abortion in sheep, especially in relation to children and women of child–bearing age.

Stillbirths

Target level: <3%

Interference level: >2%

History: dystocia, vaccinations, concurrent abortion, true stillbirths or lived for short time, number affected, age range of ewes, recent handling, feeding, singles/twins/triplets, presence of mummified foetuses, whether all affected in set, indoors/outdoors, nutritional supplements during pregnancy, particular group affected, pregnancy toxaemia.

Action:
1. As for "abortion" above PLUS
2. Assess diet and body condition of ewes.
3. Consider trace element deficiency in light of PM findings (iodine, copper and selenium).

Weak neonatal lambs

Target level: <4%

Interference level: 3%

History: Whether premature or at term births, history of abortions/stillbirths in flock,body condition of ewes and availability of milk, feeding during pregnancy & immediately post–partum, evidence of dystocia, indoors/outdoors, weather conditions, whether born weak or deteriorate, routine treatments given to newborn lambs, post–partum level of care available, vaccinations, whether diarrhoea is present (see over).

Action:
1. Submit typical cases for post-mortem examination.
2. Blood sample (serum & heparin) four affected lambs (less than seven days old) for ZST levels to assess colostrum intake, vitamin E, GSH–PX, copper and Border disease.
3. Assess body condition of ewes and diet.

Diarrhoea in neonatal lambs

Target level: <5%

Interference level: >5%

History: number affected, age first affected, duration, number of deaths, indoors/outdoors, vaccinations, severity in individuals, previous history of scour, response to treatment.
Action:
1. Submit faecal samples from at least two or three new cases for E.coli, rotavirus, cryptosporidia, salmonella and if over two weeks old coccidiosis (Neonatal enteritis package).
2. Submit deaths and non-responsive to treatment cases for post-mortem examination.
3. Assess colostrum intake by carrying out ZST's on four to six affected lambs less than seven days old.
4. Assess hygiene levels on farm.

Pregnancy toxaemia

Target level: <1%

Interference level: 1% (clinical cases may indicate more sub–clinical cases)

History: need detailed feeding history, indoors/outdoors, stage of gestation, number affected, foetal burdens, response to treatment, age range affected.

Action:
1. Blood sample affected animals (serum). Samples will be tested for BOHB, calcium and magnesium (Ewe metabolic profile). In addition other ewes may be selected at random and tested for BOHB only to assess level of risk within wider group
2. Body condition score affected ewes and proportion of other groups.
   Target BCS at lambing = 2.5–3. Avoid over–fat condition
3. Scan and feed according to foetal load. Body condition score 8 weeks pre–lambing and repeat four weeks later. Segregate thin ewes for additional feeding
4. Blood sample six ewes in at risk group four weeks before lambing to assess adequacy of diet (Ruminant energy and protein status profile)
5. Assess diet and analyse for feeding value

Barren ewes

Target level: Lowground flocks: <6% Hill flocks: <8%

Interference level: Lowground flocks >7% Hill flocks >10%

History: ram:ewe ratio (should be1:30–50 depending on terrain or 1:20 if synchronised or 1:20–30 for young rams), weather conditions at tupping
Ewe factors: age range of ewes, vaccinations, history of barren/abortion problems, whether scanned barren or did not lamb after scanned in lamb, was there evidence of large number of returns if rams crayoned or unknown problem until scanning/lambing, condition of ewes at tupping, feeding and potential stresses to ewes in period immediately after tupping.

Ram factors: condition of tups, evidence of lameness in tups, age of tups, weather conditions at tupping, whether recently purchased, introduced into tick area.

Lowground flocks: synchronised, AI/ram, teaser used, time and duration of mating period

Action:
1. Examine scanning figures: percentage of ewes with singles, twins, triplets, barren
2. Body condition score affected ewes and proportion of rest of flock but condition may have improved since tupping time
3. Blood sample 6–10 affected animals for toxoplasma, EAE, Border disease (Ovine abortion serology package)
4. If doubt over ram's fertility have full fertility examination carried out and semen sample collected and assessed. If too late in season check fertility before using following year.
5. Following year check body condition score of ewes two to four weeks pre-tupping and again post-tupping. (Rams should be body condition score of 3.5–4 at tupping). Blood sample four ewes for copper, vitamin B12 and selenium (Ovine trace element profile)

Sudden deaths

Target number of ewe deaths:
<3% depending on area and breed
Target number of hogg deaths: <3
Interference level: >one in a week
History:

   age, number affected, vaccinations, recent handling, recent change of pasture, recent treatments

Action:

   Submit carcases for post-mortem examination, as fresh as possible.

Poor growth rates/ poor condition in lambs
Interference level: >6%

History: age, number affected, when last wormed, evidence of scour, duration of problem, level of nutrition, number of deaths, type of wormer used.

Action:
1. Submit fresh faecal samples from ten lambs for pooled worm egg counts (and fluke egg counts if hoggs)
2. Blood sample six from affected group for cobalt, copper and GSH-PX (for selenium status), vitamin E and pepsinogen (Ovine ill thrift profile)
3. Post-mortem examinations
4. Assess level of nutrition available/ stocking rate

Ill thrift in adults

Target number of cast ewes: 16–22% depending on area and breed
Interference level: >23%

History: Percentage affected, duration of problem, age range, time of year problem occurring, assess nutrition, evidence of other signs e.g. diarrhoea, lameness, respiratory signs.

Action:
1. Body condition score affected ewes and proportion of rest of flock. Check for broken mouths
2. Post-mortems of typical cases
3. Submit faecal samples from ten individuals for pooled worm egg counts, Johne's disease and liver fluke egg check
4. Submit heparin and serum blood samples from six affected animals for cobalt, copper, GSH–PX (for selenium status) (Ovine trace element profile) +/– Johne's disease,   MV
5. Wheelbarrow test for Jaagsiekte   (Ovine Pulmonary Adenocarcinoma/SPA)

Respiratory tract conditions

Target level: <3%

Interference level: >3%

History: number affected, duration and severity of problem, number of deaths, condition of affected animals, vaccinations used, response to treatment.

Action:
1. Submit faecal samples from affected animals for lungworm check
2. Post-mortem examinations
3. Blood sample (serum) for MV (& possibly PI3)
4. Wheelbarrow test for Jaagsiekte   (OPA)

Skin conditions

Target level: 0

Interference level: >1

History: number affected, duration of problem, history of bought–in, whether pruritic, response to treatment, signs seen.

Action:
1. Submit skin scrapes and scabs from edge of affected area from affected animals. To be checked for mites, lice and, if appropriate, dermatophius & ringworm.
2. Examine wool for lice and scab mites (latter just visible to naked eye but need skin scrape to rule out).

Routine worm egg count monitoring

Submit fresh faecal samples from ten animals in each group of lambs. Samples pooled at lab for mean worm egg count. (Use WormScan system)

Repeat regularly July–November to direct worming.To investigate possible anthelmintic resistance a post drenching efficacy check (PDEC) on the same animals included in the individual or pooled samples of faeces analysed above is recommended on samples collected 5–7 days (levamisole), 10–14 days (benzimidazole) or 14–16 days (avermectin/milbemycin) post dosing.

Check for liver fluke eggs in January and March/April as a minimum.

Preparation of rams for breeding

Purchase rams at least 6–8 weeks before needed to allow for a quarantine period and time to settle in new surroundings. This also allows an opportunity to get the ram into optimal body condition.

Eight weeks pre-tupping:
- Assess scrotum and testicles, feet, teeth, brisket for sores
- Assess body condition of rams
- Feed to target body condition score of 3.5 (ideally 4) for the start of tupping. Usually requires supplementation of grazing with 16% protein, starting 2–3 months before mating period.
- Supplemental injection of selenium
- Worm and fluke egg check and, if necessary give wormer for roundworms
- Treat for liver fluke
- Vaccinate against louping-ill if moving into tick area
- Check clostridial disease and pasteurellosis vaccinations

Fertility testing of rams (two to four weeks pre-tupping):
- if doubt about fertility of ram/s e.g. abnormal testicles, previous history of suspected poor fertility, during season if significant number of returns
- if relying on small number of rams

Abortion, stillbirth and infertility

Target level: 1%
Interference level: >2%
Submit whole litter of foetuses with membranes and maternal blood samples for paired serology. (Packages: Pigs – foetuses, Porcine reproductive failure a or b.)

Infertility and other disorders:
Vulval discharge should be sampled with guarded vaginal / cervical swabs to avoid urine contamination as far as possible.
Package: Bacterial culture and sensitivity
Returns to service; not in pig
Group blood samples should be submitted for paired serology for evidence of active PRRS, swine flu, L.bratislava, erysipelas and parvovirus. (Package: Porcine reproductive failure a or b)

Enteric disorders

Target level: <5%
Interference level: >5%
Neonates and sucklers:
In pigs of 1 to 5 days of age diseases such as colibacillosis [ETEC, AEEC, EHEC], clostridial necrotic enteritis, cryptosporidiosis and rotavirus infection should be considered 6 days – weaning coccidiosis, Rotavirus, cryptosporidiosis, salmonellosis. To investigate, submit batches of acutely affected pigs for post mortem.
(Packages: Pigs under six months post mortem batch, Pig enteritis package 1 or2, Pig E.coli serotyping.)
If diseases such as TGE and PED are suspected, the post mortem examination will be supplemented by virus detection ; (IFA test). Paired serology is required on a representative number of affected older pigs.

Weaners and growers

In recently weaned pigs, E coli post weaning diarrhoea, rotavirus infection and salmonellosis are important diseases. In older growing pigs, swine dysentery (B.hyodysenteriae), porcine colonic spirochaetosis (B.pilosicoli), porcine proliferative enteropathy, Salmonellosis, yersiniosis and parasitic enteritis should be considered.
(Packages: Pigs post mortem batch, Porcine enteritis package 3 [post weaning] or 4 (growers and finishers), Brachyspira culture and PCR, L.intracellularis PCR [combination available], salmonella screen,worm egg / coccidial oocyst count.)
Adults:
In adults , swine dysentery, PGE, salmonellosis and porcine proliferative enteropathy should be considered amongst the potential causes of diarrhoea.
(Packages: as for growers.)

Respiratory disease

Target level: <3%
Interference level: >5%
Porcine respiratory disease is frequently of multiple aetiology, involving housing, management and combined viral and bacterial infections.

Viral disease

Swine flu, PRRS, PCV-2 and porcine respiratory coronavirus should all be considered as viral causes of porcine respiratory disease. Paired serology [2 to 3 week interval] and group sampling carcases are the best methods of investigation. At least four acutely affected pigs should be submitted for post mortem examination.
(Packages: Pigs under six months post mortem batch, PRRS PCR, paired Porcine respiratory serology.)

Bacterial and mycoplasmal disease

Pathogens including A.pleuropneumoniae, P.multocida, H.parasuis and M.hyopneumoniae should be considered. Note that respiratory disease may also be a manifestation of more generalised disease such as polyserositis.
(Packages: Pigs under six months post mortem batch, bacterial culture and sensitivity, M.hyopneumoniae lung PCR, M.hyopneumoniae throat swab PCR.)

Progressive atrophic rhinitis

Target level: 0%
Interference level: >1%
Caused by toxigenic P.multocida, for best results samples should be taken before obvious clinical signs are seen. Nasal or tonsil swabs should be submitted from at least 20 pigs in instances where the level of overt disease is low.
(Package: Atrophic rhinitis throat swab PCR.)

PMWS / PDNS

Target level: <4%
Interference level: >5%
Acutely affected pigs [6 – 12 weeks old for PMWS cases] should be submitted for post mortem. If this is not possible then carcase lymph nodes from at least 3 acutely affected pigs should be submitted. PDNS cases are usually older. Submit pigs for post mortem examination.
(Packages: Pigs under six months post mortem batch, histopathological examination.)

Locomotor and nervous diseases

Target level: <2%
Interference level: >5%
Locomotor disorders may be caused by Erysipelas or M.hyosynoviae infection or be the result of polyserositis or streptococcal infection. OCD and spontaneous fractures should also be considered.

Nervous disorders may result from streptococcal [S.suis II] meningitis, salt poisoning, oedema disease, congenital tremor or more generalised infections.

(Packages: Pigs post mortem batch, bacterial culture and sensitivity, erysipelas serology.)

Note:

Samples should be submitted from a sufficient number of animals, not individuals, and acute untreated cases should be used whenever possible. Carcases are preferable and in some cases live animals may be submitted, subject to welfare considerations.