# Clinical Assessment of Veal Calf Units

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## Introduction

For over 30 years it has been common practice in the Netherlands to feed fattening calves with an artificial milk replacer. These calves are individually housed in fattening pens with litterless full slatted floors (boxes: width approximately 65 cm, length about 170 cm). Veal calf units usually consist of about 50 boxes each, whereas the total capacity of most fattening farms varies from 100 to 1000 boxes.

About 1.2 million mostly male calves one week old are fattened in this way each year. The calves are kept until they are 5 months old and have gained about 200 kg in body weight. Because of the iron deficient milk replacer given in the last three months of the fattening period, these calves produce the desired veal meat with its characteristic color, tenderness and palatability.

Concentrating large numbers of very young animals in a small area often results in a high risk to their health. Veal calves are no exception to this rule. When there are outbreaks of diseases the attending local practitioner must face two problems at the same time. On the one hand he is confronted with many sick calves with all their individual variations. On the other hand he has to deal with an impatient fattener who requests an immediate diagnosis and treatment.

**In order to make a proper diagnosis for an entire unit the veterinarian should examine the unit as a whole and thoroughly examine some of the individual calves showing the characteristic symptoms.**

The purpose of this paper is to provide veterinary practitioners with an outline for a systematic investigation of veal calf units.

## Outline of Systematic Investigation

I. *The First Consultation*

A. It may be useful to know whether your client is the owner/caretaker of the calves or a representative of one of the industries producing the artificial milk replacer.

The following information should be obtained:

- clinical signs (e.g. diarrhea, depression, anorexia, nasal discharge, coughing, bloating)
- time of onset of these symptoms
- morbidity and mortality rates
- age of the calves
- name and address of any other person with economic interest in these calves.

In case the initial consultation is made by phone the fattener should be asked:

- not to remove any feces from the dung channels
- to take the temperatures of those calves which are seriously ill.
- to keep any fresh carcasses in a cool place.

B. During the actual visit special attention should be paid to:

- the origin of the calves (cattle-market, distribution center, dairy farm or from abroad) and how these calves were transported.
- the capacity of the fattening farm and its units.
- the history of any previous diseases.
- the nature and dose rates of drugs already administered.
- information about water sources and feeding schedules.
- the results of laboratory and/or post-mortem examinations already carried out.

II. *The Examination of Premises and Livestock*

A. For a proper examination and treatment the following items are needed:

- two flashlights (helpful in dark units; one as a reserve)
- a penlight (to examine mucous membranes)
- two thermometers and a stethoscope
- sampling equipment (for blood, feces etc.)
- stomach tube to diagnose ruminal drinkers and to relieve ruminal bloating (This stomach tube will become seriously damaged by the cheek-teeth of even one calf.)
- nose swabs and preserving fluid for virological examinations
- esoghagal feeders for oral administration of an electrolyte solution by the caretaker
- antibiotics and/or chemotherapeutics to be added to the artificial milk replacer or to treat individual animals

- vitamin solutions (especially thiamin for treatment of supposed CCN calves)
- clean overalls and boots.

B. It should be realized that calves are much more lively just before the fattener starts feeding them. Even calves which are not yet depressed but already running a high temperature will react in the same way as healthy calves and may, therefore, be easily overlooked.

The best time for examination of the calves is just after they have been fed. At that time most animals will defecate and samples are easy to obtain. Any coughing is more likely to be heard during this period of activity rather than between feeding times when the calves are at rest. The individual milk intake is known soon after feeding and the bloating of ruminal drinkers is more noticeable then.

C. Dietary aspects.

The only food given to veal calves is an artificial milk replacer. Each feed manufacturer provides directions for using the milk replacer as well as a table correlating the age of the calves with the total amount of milk powder and water to be given per feeding. The daily milk intake is gradually increased from 2-3 liters a day during the initial fattening period to 16 liters a day during the final fattening period. Up to the seventh or eighth week of the fattening period a calf has to drink as many liters of milk per feeding as the number of weeks spent on the fattening farm. Usually the calves are fed twice a day. The concentration of the milk replacer solution changes from approximately 120 grams milk powder per liter the first week to 170 grams per liter during the last two weeks. The maximal concentration of each milk replacer depends on factors such as the breed, sex and type (dairy or beef) of the calves.

Low concentrations of powder at the beginning of the fattening period may lead to deficiencies which will become evident in the second or third week of the fattening period. It should be realized that the powder concentration for daily maintenance requirements must be between 0.8 and 0.9 per cent of the calf's body weight. Care should be taken that calves are not given too high a concentration of milk replacer because they will either lose their appetite or become too fat.

Special attention should be paid to the daily fluid intake at the beginning of the fattening period. The daily fluid requirement of a healthy calf is assumed to be approximately 12 per cent of the calf's body weight but the daily fluid intake may become as high as 40 percent of the body weight in cases of diarrhea.

Normal feces from a milk-fed calf have a yellow-brownish or greenish color and have a firmness similar to custard. Both color and firmness may be affected by supplements which have been added to the milk replacer. Improper preparation of the milk replacer solution may also cause changes in the feces.

D. The following criteria will enable the practitioner to get an impression of the process of fattening:

(i) daily gain:
dependent on breed, sex, initial body weight, length of the fattening period, brand of the milk replacer, method of calculation, etc.

(ii) food conversion:
dependent on the same factors as mentioned above; it ranges between 1.7 and 1.8. The food conversion may also be expressed as growth per bag. For instance: final weight minus initial weight is 147 kg. To reach this gain in body weight 10 bags of milk replacing powder of 25 kg each were used. Therefore, each bag of 25 kg produced a gain in body weight of 14.7 kg. From this the food conversion may be calculated as

$$\frac{\text{25 kg powder}}{\text{14.7 kg body weight gain}} = 1.7$$

(iii) mortality rate:
This indicates the total number of calves that died during the fattening period; it is expressed as a percentage of the number of animals at the beginning of the fattening period. Again, it varies with the breed, sex, type and origin of the calves and it is also very much dependent on the management ability of the fattener. Normally, this figure should vary between 2 and 5 per cent.

E. Housing Aspects.
- shed temperature — approx. 17-20°C (for small and sick calves) approx. 10-15°C (for healthy calves)
- relative humidity — approx. 50-75% (often higher in barns; up to 98%)
- max. fan capacity — 150-200 $m^3$/calf/hour
- air speed — the upper limit is 200-250 cm/sec. current in the shed. Close to the calves it should not exceed 15-20 cm/sec. at 18°C.

F. During physical examination a quiet standing healthy calf has a respiratory rate of 20-40/min and a heart rate of approx. 120/min. Its body temperature usually is 38.5°C with an upper limit of 39.2°C.

III. *The Actual Farm Visit*

Before you rush to the patients, take a look around the barnyard and mixing room. Expecially note the tidiness of the area and the condition of the buildings, ventilation system, etc.

Pay particular attention to:

A. The yard.
- general impression (such as presence of rubbish or carcasses)
- type and state of maintenance of the calf sheds
- artificial milk replacer storage (loose in silo's or packed in sewn open mouth bags)
- mechanical or natural ventilation (especially the position of the air-inlets)
- presence of any trash outside the mixing room

(buckets, wrecked boxes, empty medicine bottles, packings)
- presence of disinfecting solutions for boots.

B. The mixing room.
- general impression
- water heating system (most important if problems in the preparation of the milk replacing solution are to be avoided)
- milk remnants in the mixers (which may cause problems when the environmental temperature rises)
- the following items should be present:
  - refrigerator (Are any drugs kept there?)
  - thermometers
  - sterile syringes and needles
  - stomach tube (What is its condition?)
- administration (health records, feeding records, etc.)
- are there special boots and overalls available for visitors?

If your visit is during feeding time, check the mixing time of the milk replacer solution (approx. 5 min.), the temperature of the milk in preparation (approx. 65°C) and the temperature of the solution when given to the calves (approx. 40°C).

Both the regularity and the order of feeding are of great importance. Changes may give rise to problems during the absence of the fattener, when his work is taken over by an assistant.

C. The units.

First check those units with the fewest problems.

1. **On entrance** take special notice of:
- drafts
- air inlets properly adjusted
- smells, stench
- reaction of the calves (Do they rise? Bawl and play? Are they too quiet? Is there any coughing?)
- the position of the thermostat and the function of the air-heating systems.

2. **When walking in front** of the boxes you should notice:
- the condition of the buckets. (Are they dirty, damaged or placed in too low a position?)
- whether the calves finish their milk completely or not.
- the condition of the boxes (holes in partitions, suckled pen fronts, damaged slatted floors).
- any fouling of the slatted floors (vomit, feces).
- any messages on the pen fronts.

3. **Also pay attention** to each calf:
- condition and meatiness (not yet full fleshed in the first 2 or 3 weeks; the body weight should have been doubled in eight weeks)
- hair coat:
  - piloerection may be caused by low environmental temperatures
  - a bad coat and poor condition may be indicative of a chronic disease such as omphalitis
  - As a preventive measure against lice and hyperthermia calves are often clipped at the age of approx. 12 weeks.
- dirty heads and necks (often seen together with feces that are too pasty).
- posture of the calf (standing, lying with a stretched neck, arched back).
- position of the head (attentive, straight, drooping, symmetrical, grinding of teeth).
- position of the ears (otitis, meningitis, drooping).
- eyes (conjunctivitis, glaucoma).
- nostrils (wide open due to dyspnoea, serous or mucous discharge).
- position of forelimbs (spread in case of dyspnoea).

4. **Walking behind** the boxes one may notice:
- curiosity of the calves (if it is still possible they should turn around their boxes).
- dirty hindquarters (alopecia caused by diarrhea or zinc deficiency, hereditary hairlessness).
- position of the hindlimbs (arched back: abdominal pain; crossed legs: weakness, spastic paresis, arthritis).
- bloating.
- umbilicus.
- the site of the feces (box, calf, dung channel).
- smell, color and consistency of fresh feces.

Take notice that manure from heifer calves often looks more watery because of dilution by urine.

5. **While doing your rounds** along the units you should form opinions about:
- the facilities and stock (calves, buckets, sheds).
- the nature of the complaints and their seriousness.
- morbidity rate of each observed clinical symptom.
- set-up system ("all in - all out" method, continuously occupied).
- "inputs" (calves to replace deceased ones).
- "poor doers" (calves who perform poorly).
- Has each calf its own bucket or are the buckets exchanged?
- type and condition of the boxes.
- environmental conditions in the shed at the calf's level.
- cleanliness of the units (floors, feeding walkway, boxes).

D. Physical examination of the individual calf.

It is possible for small calves to be lifted out of their boxes in order to have better access to them during the examination. This will lead to an initial rise in respiratory rate and heart rate, but with careful handling these will soon stabilize. Most calves will stand still if they are allowed to suck one's fingers. Use the least amount of restraint that is necessary. Animals that are too sick to get up by themselves must not be manipulated unnecessarily.

1. **Inspection**
- breed or cross-breed
- bull calf or heifer calf
- condition (may be a bit bony at first but certainly not gaunt)
- carriage and gait (wry face, bent back, crooked legs, drawn up abdomen)
- behaviour (sucking-reflex)
- striking irregularities (lesions of nozzle and lips, umbilical hernia).

2. **Auscultation**
- lungs: usually a calf has a costo-abdominal way of breathing. In case of bronchopneumonia this is more often abdominal. Start auscultating at the lowest possible point i.e. just between the rib-cage and elbow. Repeat this procedure after interupting the calf's breathing for a short while.
- heart: in emaciated calves the frequency of heart-beats is often too low. Be sure to notice any irregularities in sound or in rhythm.
- rumen: For several hours after feeding a metallic tinkle and splashing sounds can be heard on auscultation of the left abdominal wall of ruminal drinkers during percussion and ballottement.

During auscultation the hair coat can be inspected to see if there are any lice or signs of mycosis.

3. **Palpation**
- earbase (if a wry face or a drooped ear is present)
- inspection of the mucous membranes of the mouth and eyes
- throat region (to detect irritation spots caused by injection or to provoke coughing)
- abdomen and umbilical cord
- joints; if necessary inspect the cleft of the claws.

4. **Temperature**

Insert the moistened thermometer with your hand covered by a plastic bag. Check the anal reflex, straining and the appearance of the feces. The calf will possibly defecate because of the irritation and a fecal sample can be collected in the plastic bag.

E. Samples.

**Faeces:** to have a reasonable indication of what is going on you must take your samples from at least 5-10 per cent of the calves with acute clinical signs. If it is also possible, sample some healthy calves. Fecal samples can be stored in a refrigerator for about 24 hours before bacteriological examination (*Salmonella, E. Coli, Proteus).*

Samples to be examined for rotavirus, coronavirus or cryptosporidia can be stored for several days if they are kept in a cool place (4°C).

**Urine:** if a furoxone intoxication is expected.

**Skin:** take your sample for lice from the withers (hairs). For mange a deep skin scraping. For dermatophytes some material at the border of the lesion.

**Blood:** In spite of the induced iron deficiency later on, a veal calf must not be anaemic during the first 10 weeks of the fattening period. One would like to see a hemoglobin of at least 6 mmol/l (10 gr%). This must not fall beneath 5 mmol/l or rise above 5.3 mmol/l (8.5 gr%) during the fattening period in order to obtain a mean hemoglobin of 4.7 - 5.3 mmol/l (7.5 - 8.5 gr%) at slaughter.

Instructions for collecting blood samples are best provided by your local laboratory.

Respiratory diseases caused by BVD, BHV-1, $PI_3$ or RS virus are identified by the presence of specific antibodies in the serum. It is also possible to tect BVD virus in EDTA blood (white blood cells)

**Nose swabs:** to demonstrate BVD, BHV-1, $PI_3$ or RS virus.

**Ear swabs**: in case of otitis.

**Necropsy** : More information can usually be obtained from moribund calves than from calves that are already dead because there is no post mortem autolysis.

Most institutes that perform autopsies need to know about your findings at the farm, as well as the treatments that have already been used.

IV. *Administration*

On most fattening farms, journals are kept concerning the consumption of artifical milk replacer, treatments and mortality.

Also some representatives of the industries keep records of the farms they visit. These are very useful to get an impression of the performance of a farm over the years.

Your own administration should indicate the good and the bad points of managment on the farm, particularly with regard to medicine consumption and previous problems in other groups. This administration will be of great help, not only for yourself but also for your colleagues who take over during the holidays.

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