

Procedure for Nylon Bag Technique

1. Prepare samples by grinding through laboratory hammer mill with a 2.5 mm screen.
2. Record weight of the clean, dry, numbered nylon bag (40 to 60 micron pore size).
3. Weigh approximately 2.5-3.0 g samples for dry feeds (hays, straws, etc.) or 5.0-6.0 g samples for protein supplements, into a weighing boat.
4. Transfer the sample to nylon bag.
5. Record the weight of bag plus sample.
6. Weigh duplicate samples for determining washing loss.
7. Determine the dry matter (in duplicate) of the samples and use the average values when calculating dry matter (DM) of the sample.
8. Attach the nylon bags to the respective plastic tubes for incubation in the rumen at different times.
9. Plastic tubes with attached bags are kept in separate polythene bags for each sheep.

Note. Four plastic tubes with 3 bags each (total 12 bags) can be incubated in the rumen of sheep at any one time. **When using cattle, considerably more bags can be incubated.**

Incubation in the rumen

Following incubation timings may be used:

Roughage sample: 4, 8, 16, 24, 48, 72 and 96 hours

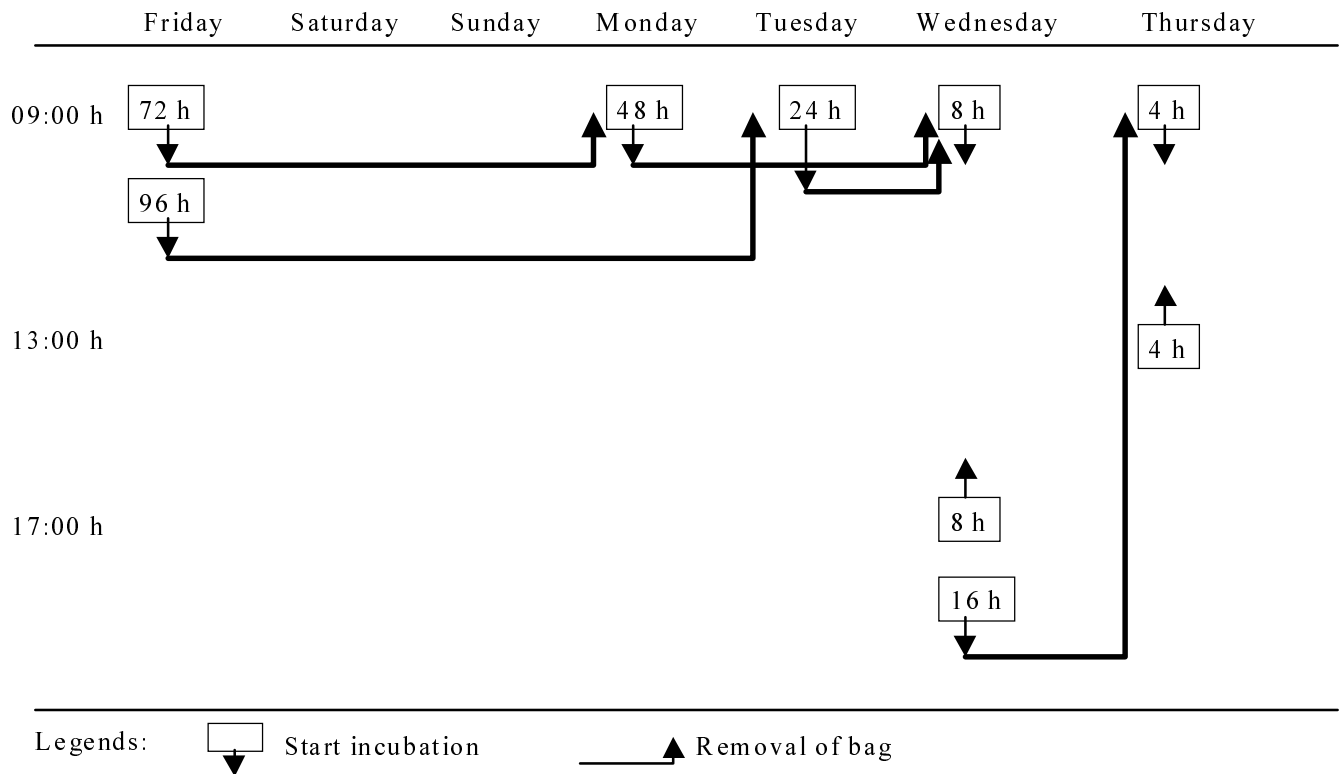
Protein sample: 2, 4, 8, 16, 24 and 48 hours

These are the times required to reach the potential extent (asymptote) of degradation. For certain samples these incubation times may have to be altered. If there is a large difference between 48 and 72 hours it is necessary also to obtain measurement at 96 h to adequately describe the feed.

Three sheep are used and the mean of the three results for each time are used when calculating the rate of degradation.

The diet of the animals should be similar to the substrates being tested.

Incubation schedule. Following schedule may be used.



With this schedule, 6 samples can be done each week (two tubes for each time; and three bags on each tube).

The appropriate plastic tubes with attached bags are pushed well in the rumen (steel rod with blind end will facilitate the process, it will also help when withdrawing the bags) and the small string(s) are then attached to a wire loop inserted through cannula top. Tighten the cap of the cannula.

Withdrawal of bags from rumen, washing and drying

1. Withdrawn plastic tubes with attached bags are immediately placed in a bucket of cold water to prevent further fermentation and to wash off the feed particles adhering to the outside of the bags.
2. Transfer them to domestic washing machine for 20 min cold water wash. The bags could also be washed under running cold water in laboratory until the water is clear.
3. Detach the nylon bags from the tubing by cutting the rubber bands.
4. Dry the bags to constant weight at 60-65°C which is normally achieved in 48 hours.
5. Weigh the bags immediately and record the weight of bags plus incubated samples.
Make sure the bags don't absorb moisture.

Re-use of nylon bags

Nylon bags can be repeatedly used. Care must be taken that they are well cleaned, washed and dried before re-use. This is essential to keep the pores of the bags open. Occasionally check them under a microscope. Damaged bags should be discarded. Steps:

1. Remove the used material and turn the bags inside out and dust away loose particles.
2. Soak the bags in hot soapy water overnight.
3. Wash the bags in a domestic washing machine with one full complete wash.
4. Dry the bags.
5. Turn the bags outside in and keep in a dry place.
6. Make sure to clean the plastic tubes with soapy water and remove any digesta inside the tube with a thin wire.
7. Filter of the washing machine needs to be cleaned from time to time.

You will be interested in two procedures namely:

1. Measurement of feed value of different materials and
2. Measurement of rumen environment.

For 1 use a standard rumen environment e.g. hay or leguminous forages etc. for all samples. For 2 use a standard substrate in bags e.g. hay, and vary the rumen environment e.g. by giving a range of types and amounts of the supplements being tested.

Computer programmes NAWAY and NEWAY are available, use Neway, which allows for the lag phase when you are dealing with roughages.

The Neway programme is based on equation $p = a + b(1 - e^{-ct})$ same as Naway.

Solubility is defined as weight loss after soaking the bags, with the substrate, for 1 hr in water at 38°C then washing in the washing machine in the normal way.

For Neway programme a' is solubility, and small particle loss

b' is the insoluble but fermentable fraction $b' = (a+b) - A$

c = rate constant

Period before insoluble material begins to be degraded, L , is lag phase.

See also Chapter 10 in Energy Nutrition in Ruminants.

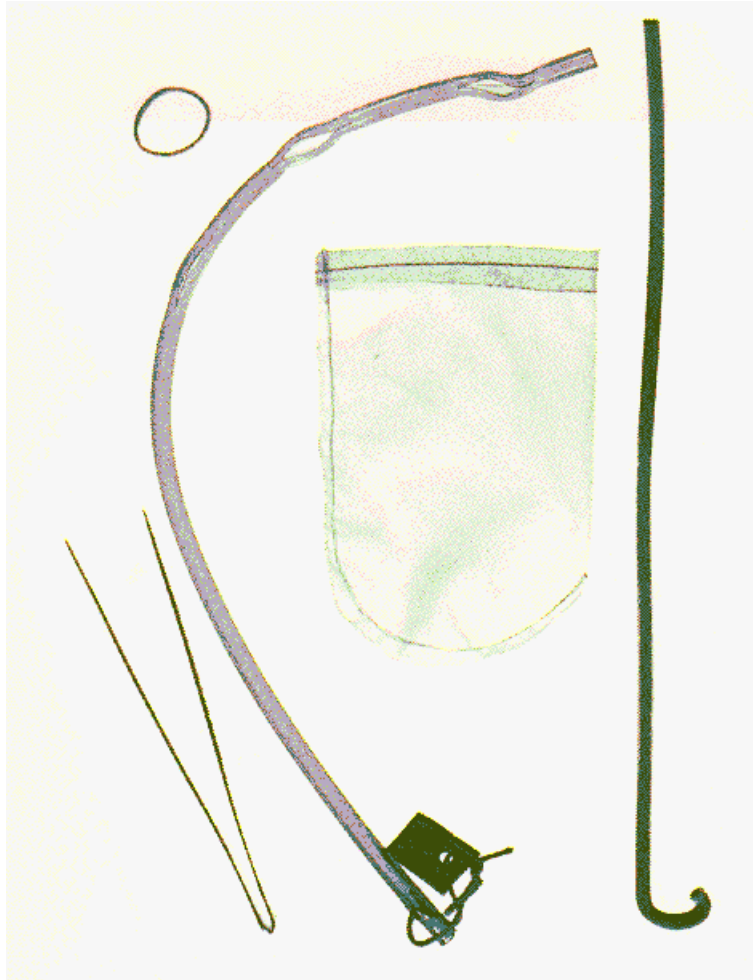


Figure 1. Showing forceps, rubber band, plastic tube, nylon bag and rod used to insert bags.



Figure 2. Showing plastic tubing and attachment of nylon bags for suspension in the rumen.