

# A note on the insertion of rumen cannulae in pregnant ewes

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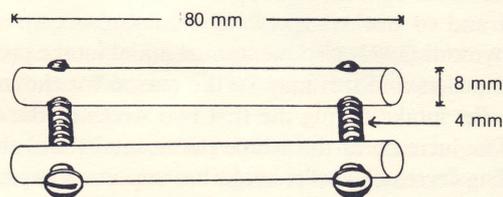
Modifications to a simple and rapid technique for the insertion of rumen cannulae in sheep are described. The modified technique, executed in three phases, was developed to facilitate the fistulation and insertion of rumen cannulae in pregnant ewes, especially during late pregnancy.

Wysigings van 'n eenvoudige en vinnige tegniek om skape met rumenfistels toe te rus, word beskryf. Die nuwe tegniek word in drie fases uitgevoer en is spesifiek ontwikkel vir die rumenfistulering van ooe gedurende laat swangerskap.

**Keywords:** Rumen fistulae, insertion, pregnant ewes

Cattle and sheep fitted with permanent rumen cannulae are widely used as experimental animals. The cannulae allow entry into the rumen on a routine basis without undue stress to the animal. The technique reported by Hecker (1969) is a simple and rapid method for fistulation of large numbers of sheep and was used extensively by De Waal, Engels & van der Merwe (1980) to insert rumen cannulae in wethers.

Currently the research programme at this Institute often requires the fistulation of ewes during late gestation (three to four months pregnant). However, the technique described by Hecker (1969) proved to be risky and inadequate when applied to these ewes and it became evident that the procedure required modification, since the rumen is partially displaced by the developing foetus. At present the procedure followed at this Institute to insert rumen cannulae (2,5 cm diameter) in pregnant ewes is basically the same as the one described by Hecker (1969), except that a smaller type of clamp is used and a third phase is included in the procedure. The new metal clamp (Figure 1) consists of two brass rods 8 cm long and 8 cm in diameter. The rods have two holes each, 1 cm from the ends. The holes in one rod are threaded to take 4 cm diameter brass screws while those in the other rod are without thread. The total mass of the clamp is only 70 g which limits gravitational stress on the rumen wall and skin during the critical healing process.



**Figure 1** The brass clamp used to occlude the blood from a fold of the rumen wall.

The three-phase technique which is currently used at this Institute to fistulate pregnant ewes, is as follows: After clipping

the wool from the left side of the sheep in the region of the anterior dorsal abdomen, the area is thoroughly cleansed with a mild detergent. The animal is then restrained on its right side and local analgesia of a 10 × 10 cm area is produced by infiltration of an appropriate local anaesthetic. After the area is disinfected with an aqueous iodine solution, a 4 cm long incision is made in a ventro-caudal direction through the skin, originating 4 cm caudal to the last rib and ventral to the transverse processes of the lumbar vertebrae. The underlying abdominal muscles and peritoneum are separated by blunt dissection to continue the 4 cm opening into the abdominal cavity. This shorter incision, compared to the longer 5 cm incision recommended by Hecker (1969), eventually helps to ensure a better fit to the rumen cannulae. The rumen wall lying beneath the opening is withdrawn and held temporarily with Mayo-Oschner forceps. After inspection of the exteriorized fold to ensure that it is in fact the rumen, the brass clamp (Figure 1) is applied and the screws tightened. A silk suture is then placed through the skin, the rumen wall under the clamp and the skin on the other side. It is then tied over the clamp. The first phase of the operation is concluded by giving the animal a subcutaneous injection of a long-acting antibiotic. Depending on the skill of the operator and excluding the preparatory work involved, the first phase can be performed in five to ten minutes. Furthermore, it is only during phase one that it is necessary to restrain the animal in right lateral recumbency.

The second phase commences after about eight days when rumen fluid starts seeping from the exteriorized part of the rumen. The suture, clamp and occluded rumen fold are then removed, leaving a fistula through which a flexible rubber cannula can be inserted. This corresponds to the second and final phase of the procedure described by Hecker (1969). In wethers (De Waal *et al.*, 1980) and non-pregnant ewes the technique has been successfully applied. However, in ewes in late gestation, the displacement of the rumen by the enlarging uterus, exerts greater tension on the anterior portion of the healing wound and leads to incomplete adhesion. Consequently, when an attempt is made at this stage to insert a rumen cannula, the partially established bond between the rumen and the abdominal tissue may rupture. This rupture may well go undetected at the time of insertion, but rumen fluid will invariably leak into the abdominal cavity, resulting in the delayed development of a fatal peritonitis.

To solve this problem, a third intermediate phase was introduced. The ewe is fitted with a harness, identical to those used for the collection of faeces from wethers, without the bag

attached. After removal of the suture, brass clamp and occluded rumen fold, one end of a polyethylene tube (20 cm long and 1,5 cm in diameter) is inserted into the rumen through the fistula and the other end attached to the harness to keep it in position. After 24 to 48 hours this tube is replaced by another tube with a 2,5 cm diameter for a further 24 hours. The insertion of these tubes allows ample opportunity for the wound to heal before the rubber cannula itself is inserted. They prevent the fistula from closing and the increase in diameter from 1,5 to 2,5 cm gradually enlarges the fistula prior to the insertion of the cannula. This concludes the second phase of the operation. The concept of progressively enlarging the fistulae by successively inserting larger diameter tubes (1,5 and 2,5 cm) resembles to some extent that described by Taljaard (1973). Taljaard (1973) used a different technique to fistulate the sheep and then proceeded to increase the fistula diameter from 2,5 to 8,3 cm by progressively inserting larger diameter rumen cannulae.

The third and final phase is concluded by removing the 2,5 cm diameter tubing at the end of the 48 to 72 hour healing period and inserting the flexible rubber cannula with virtually no risk of peritonitis.

A very important feature of this method is that the fistulated animals can be used for experimental purposes immediately after completion of phase three. Prior to the introduction of the new three-phase technique, even though extreme care was taken during the insertion of the rumen cannulae, three ewes (out of a total of 30) died due to peritonitis. To date, the new technique has been successfully used to fistulate 105 pregnant ewes, some of which were cannulated only three days prior to parturition. A further advantage is that the improved fit of the rumen cannulae reduces problems that are usually caused by excessive leakage of rumen fluid, especially under free-range conditions.

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