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A NOTE ON FITTING RE-ENTRANT CANNULAE ON THE DUODENUM OF GROWING YOUNG CALVES FOR DETERMINING OF SITE AND EXTENT OF UTILIZATION OF NITROGEN

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Introduction

In the series of study on effects of the degradability of protein in the rumen on nitrogen utilization of growing young calves in this institute, efficiency of nitrogen utilization has been suggested being influenced by the digestion and assimilation in the posterior digestive tracts to the rumen²⁾. The suggestion necessitates to partition the nitrogen utilization into several phases in some sections of the digestive tracts.

The degradation of protein in the rumen has been measured with either *in sacco* or *in vivo* technique applied to steers or mature ruminants. The *in sacco* technique has been demonstrated to be available to measure the degradability of protein for growing young calves in this institute. It is necessary to compare the *in sacco* technique to the *in vivo* technique for materialization of the technique to determine the degradability of protein in growing young calves.

For the first step, the duodenal re-entrant cannulae are to be fitted to growing young calves to determine amounts of degraded protein in the rumen and to measure the site and the extent of digestion of nitrogen in the digestive tracts. ALIYEV³⁾ has recently proposed a new technique for duodenal re-entrant cannulation to overcome the difficulties confronted with the bent cannulae fitted in an end-to-side manner. He claimed that the technique was satisfactorily able to apply to lactating cows and 6-month-old bulls.

Young calves possess an inferior ability to resist to such stress as surgical operation to fit cannulae. The duodenum of a young calf is much narrow in diameter and thinner in the intestinal tissue than that of larger ruminants.

Thus, it needs to assess the applicability of the technique proposed by ALIYEV¹⁾ to a young calf.

The present report was purposed to describe the technique for reentrant cannulation of the duodenum of growing calves weighing about 100 kg.

Materials and Methods

Animals used were 5 Holstein castrated male calves weighing about 100 kg. Surgical operation to fit the re-entrant cannulae in the duodenum was done by the methods described by ALIYEV¹⁾ with some modifications. Calves were secured on a surgical table in the right side up under general anaesthesia. An incision was made as described by ALIYEV¹⁾ to expose the duodenum. After clamping the intestine at two separate sections, the gut was secured by two circular pursestring sutures. The duodenum was, then, dissected between the sutures. The cannula shown in Fig. 1 was inserted to each open end of the cut intestine and was fitted by tightening the pursestring sutures. The surgical cloth was sutured to the gut for prevention of the development of exuberant granulation and the internal disc with several holes was screwed onto the surgical cloth. Another surgical cloth was placed onto the internal disc and was sutured to the intestine at 4 or 5 points. Sterilized artificial plastic film tube was inserted into the body cavity through the stab incisions to aid the exteriorization of the cannulae through

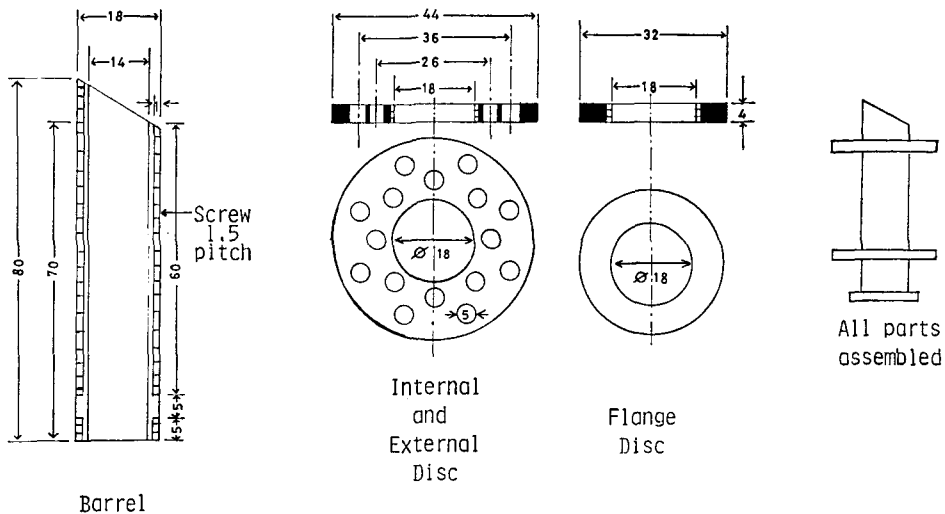


Fig. 1. Schematic illustration of the duodenal re-entrant cannula
The unit of figures in the illustration: mm.

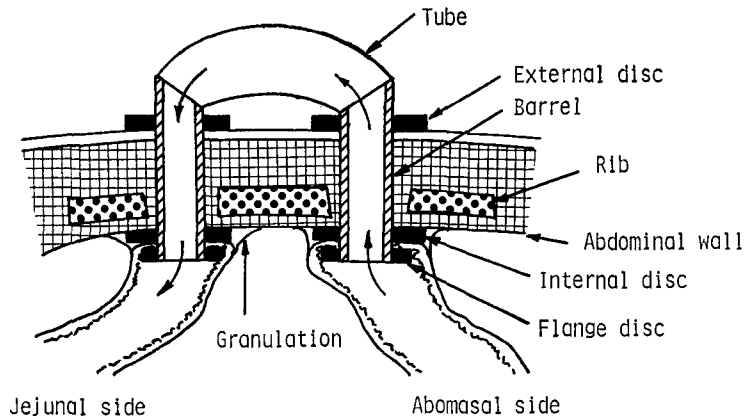


Fig. 2. Scheme of duodenal re-entrant cannulation.

the incisions. The exteriorized cannulae were fixed with the external disc screwed onto body surface. The external ends of the cannulae were connected with a spring implanted tube of polyvinyl chloride resin. Schematic illustration of fitting of the cannulae was shown in Fig. 2.

Results and Discussion

The internal disc of the cannula had some difficulties of placement of the cannula in position. For the first 2 cases of cannulation operation, the cannulae were forced out and dropped from the body at 2 weeks after operation by the combined effects of the development of exuberant granulation and increased internal pressure of the body cavity because of restored appetite. The internal disc was made several holes on the flange as shown in Fig. 1. Application of the holed internal disc with surgical cloth enabled for granulation to penetrate through the internal disc and to develop solid granulation tissue attaching to the abdominal wall. This modification of the ALIYEV'S method secured the cannulae firmly in position of the body.

It took about 2 weeks after operation for remaining 3 calves to be placed on the experiment to determine the site and the extent of digestion of nitrogen in the digestive tracts. Calves were able to remain on the experiment more than 100 days. After that period, calves had some difficulties to convey the chyme through the cannula because of much greater amounts of the chyme against the narrow opening of the cannula. At the time, dry-matter intake averaged 3.5 kg daily. Thus, it suggests that replacement of the cannulae are to be needed or to terminate the experiment within the period described above. The results of the experiment on the nitrogen

utilization were presented in the 41st annual meeting of Hokkaido Branch, Japanese Society of Zootechnical Science in Shintoku⁹.

Acknowledgement

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Plate I

1. Internal disc with holes screwed onto the barrel.
2. Surgical cloth placed onto the internal disc.

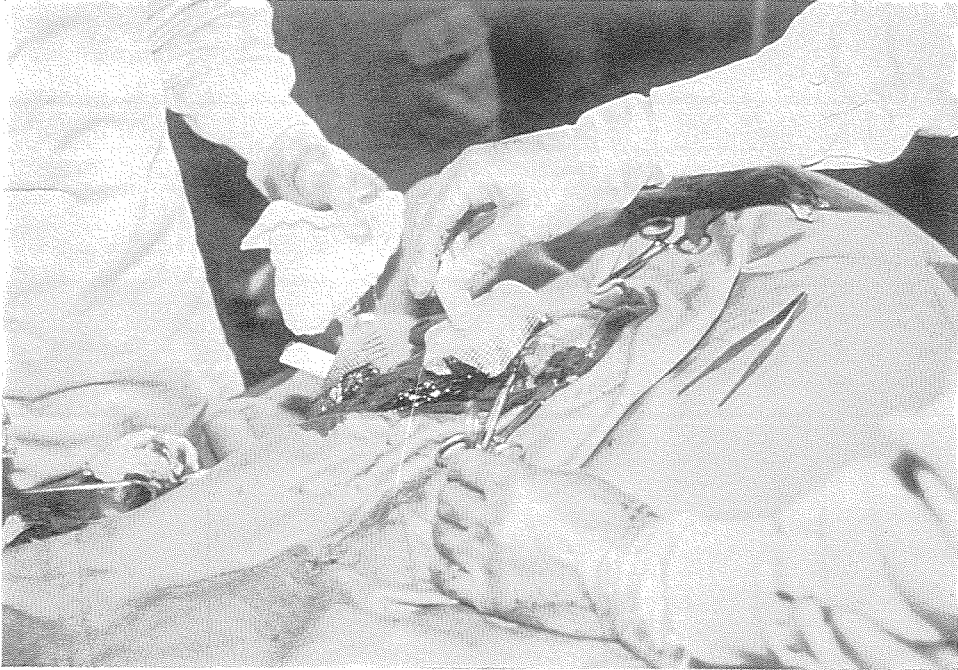
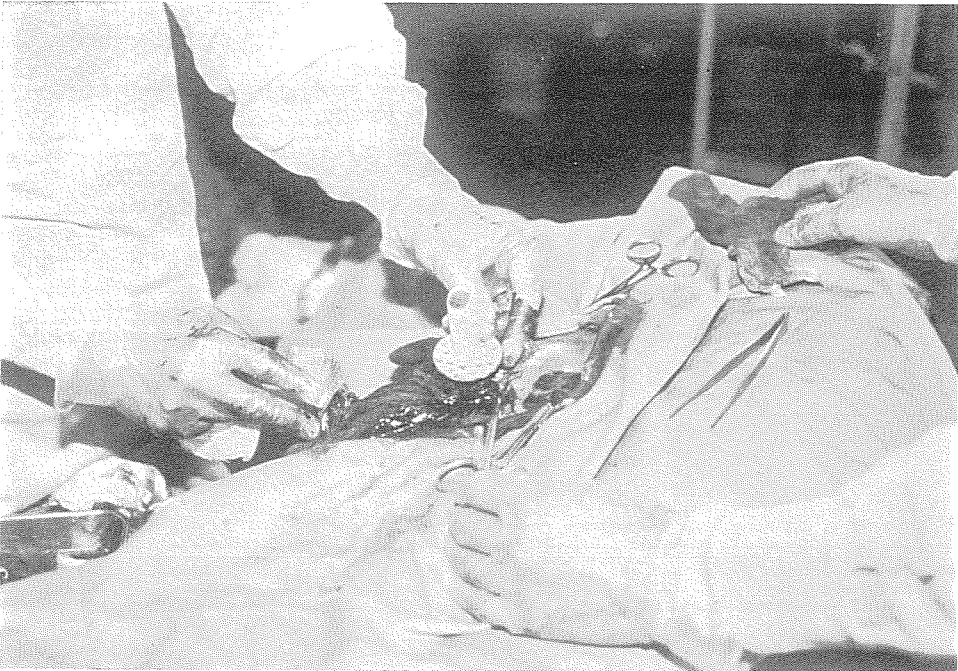


Plate II

3. The canulae connected with a spring implanted tube.
4. The chyme was collected and sampled using a long tube through the cannula on abomasal side, and returned through that on jejunal side at a constant rate of flow.

