

Closed Suturing Techniques Using a Bar-Suture for Correction of Left Displaced Abomasum— A Review of 100 Cases

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SUMMARY

Since September 1, 1981, a bar suture has been used to percutaneously correct left displaced abomasum (LDA). A total of 100 cows have been treated, with an 88% recovery rate. Several concurrent diseases were present among the affected cows with the highest incidence being ketosis and metritis. The death rate was low. Only one of six fatalities was directly related to the technique.

INTRODUCTION

Several reports are available on the recovery rates of dairy cows following surgical corrections of abomasal displacement.¹⁻⁶ Most practitioners claim high success rates following surgical treatment. Economic considerations such as veterinary expenses are the principal disadvantage of any surgical fixation technique.

An alternative approach to abomasopexy or omentopexy via laparotomy is the closed suture (or blind stitch) technique. The main disadvantage of this method is that the surgeon is not certain the needle and suture have penetrated the abomasum. However, the technique is very popular among some veterinarians. Still other veterinarians refuse to perform the technique, as the technique is blind.

This report describes the result of surgical treatment of 100 cows with LDA. A precutaneous closed technique was used which allows identification of abomasal penetration.

MATERIAL AND METHODS

The LDA is diagnosed by history and physical examination.⁷ (Fig. 1) The ventral abdomen to the right of the midline is clipped from the umbilicus to the xiphoid cartilage. The area is scrubbed and the right subcutaneous abdominal vein marked, as the vein collapses when the cow is in dorsal recumbency. Each cow was given an intravenous injection of 30-50 mg xylazine.^a The cow was then cast on her right side utilizing a rope, and rolled in a clockwise direction to dorsal recumbency (Fig. 2, 3). The rear legs were extended caudally and tied individually to an immovable object. The cow was maintained in this position by hay or straw bales or person(s) placed besides the shoulders. No restraint of the forelimbs was em-

^a Haver-Lockhart Laboratories, Shawnee, KS.

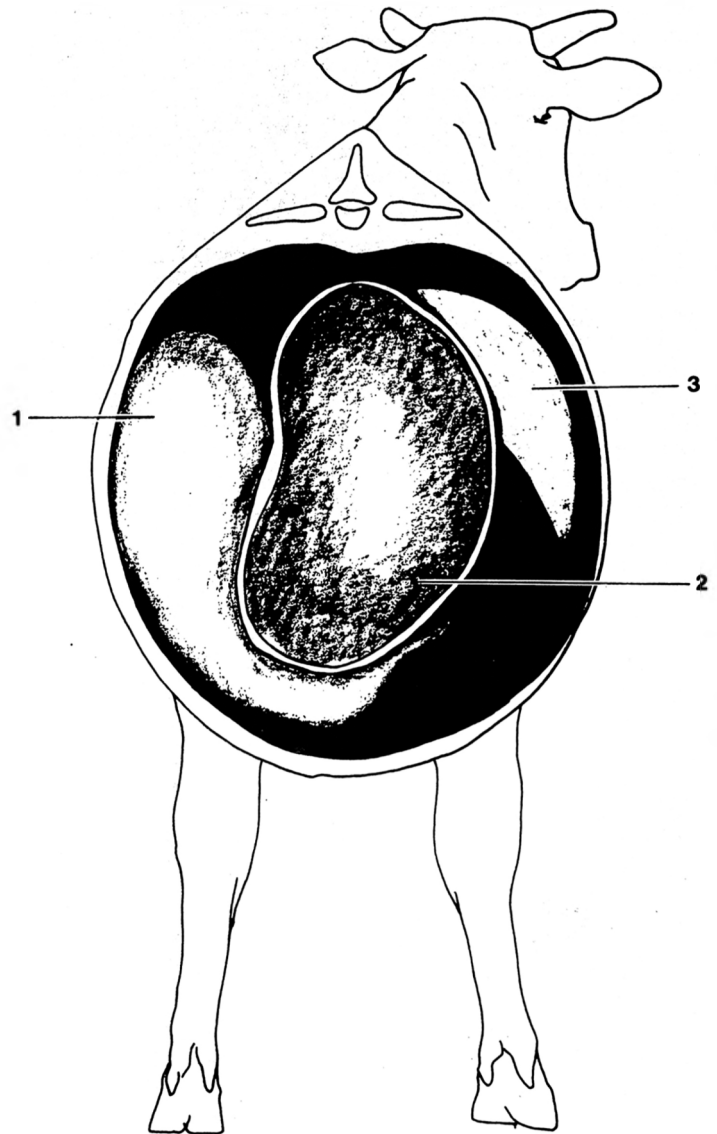
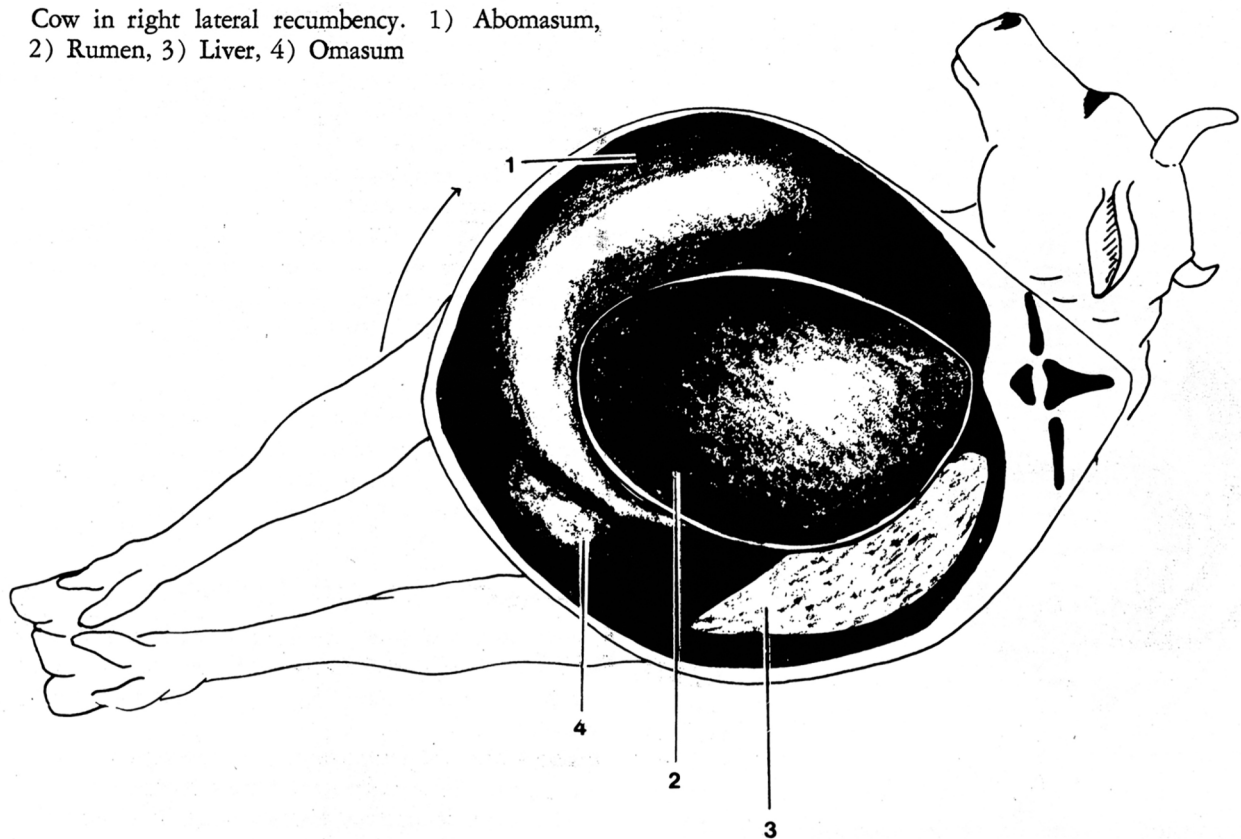


Fig. 1. Caudal view of cross section of cow with left-displaced abomasum. 1) Abomasum, 2) Rumen, 3) Liver

Fig. 2. Cow in right lateral recumbency. 1) Abomasum, 2) Rumen, 3) Liver, 4) Omasum



ployed. No local anesthesia was used.

The majority of the 100 cows in this study were Holsteins. They were usually between 5-6 years old and were 5-21 days postpartum. The predominant concurrent diseases were ketosis, metritis and mastitis (Table 1). All cows were surgically treated during a 10 month period (September 1, 1981, to June 30, 1982). The first 50 cases were selected for this procedure because a laparotomy was not considered economically feasible as the cows were relatively old and had several concurrent problems. This group of cows functioned as the experimental group. These cows would otherwise have been culled for slaughter. The other 50 cows were all lactating dairy cows selected by the farmer for this technique, due to its low cost and the procedure could furthermore be performed on the farm.

SURGICAL TECHNIQUE

Percussion/auscultation of the body wall for the detection of a ping reveals the location of the abomasum and the site of trocarization (Fig. 3). A 12 French (4 mm) trocar/cannula^b is inserted through the skin, muscles, fascia and peritoneum into the abomasum (Fig. 4). The trocar is then removed, letting the abomasal gas escape through the cannula, indicating the cannula is in the abomasum (Fig. 5). The abomasal gas has a distinctive odor and can be detected by smell. Further certainty of abomasal penetration can be assured by passage of a 20 cm length of PE Tubing^c and aspirating the liquid contents. This fluid is then placed on a piece of wide range (pH 2-11) pH paper.^d The abomasal fluid will be consistently acid (pH 2-3) in nature. A 3 cm long, 10 French (3.3 mm diameter) polypropylene bar, with a centrally attached 30 cm long Polyamide suture^b is then

pushed through the cannula with the trocar into the abomasum (Fig. 6). The trocar is constructed with a small longitudinal groove, which has to be placed over the suture when the bar is pushed through the cannula (Fig. 6). The cannula is removed, leaving the bar in the abomasum (Fig. 7, 8). A hemostat is fixed to the end of the suture until the second

Table 1 No. of cases treated, their outcome, and no. of concurrent diseases among 71 cases.

Total no. of Cases	100	
Not operated	4	4%
No. operated	96	96%
No. recovered	88	88%
Suture pulled out/Reoperated left flank	2	2%
Died	6	6%
Concurrent diseases		
Metritis	25/71	35.2%
Ketosis	44/71	62%
Mastitis	9/71	12.7%
Retained placenta	5/71	7%
Other problems	3/71	4.2%
No. concurrent diseases	7/71	9.9%

^b Jorgensen Laboratories, Loveland, CO.

^c Clay Adams, Parsippany, NJ.

^d Scientific Products, Chicago, IL.

RESULTS

A total of 100 animals were treated, of which 88 cases (88%) had a satisfactory recovery. The mortality rate was 6% (6 cases) and in 4 cases (4%) the procedure was cancelled and 2 bar sutures pulled out. Six cows died 1 to 11 days after surgery and necropsy revealed a case of hemorrhagic enteritis caused by *Clostridium perfringens*, a case of perforating ulcer in the reticulum and a case of pneumonia. One cow died due to the sutures pulling through the abomasal wall resulting in fatal peritonitis. The last 2 cows were unavailable for necropsy.

Six operations failed. Two bar sutures pulled out, allowing the abomasum to redisplace. The two cows were reoperated from a left flank approach and an abomasopexy was performed. The other four operations were cancelled because the abomasum could not be auscultated with the cow in dorsal recumbency.

DISCUSSION

The results obtained with this bar-suture technique have been encouraging. One hundred cows were treated, achieving a recovery rate of 88%. The mortality and recurrence were minimal.

The 100 cases presented in this series included several cows with severe illness due to complications other than LDA. The incidence of concurrent diseases were high, and the first 50 cows treated would have been slaughtered if the bar-suture technique had not been applied. Four of the six fatalities were among cows in this group. It has been shown that LDA cows with several concurrent diseases have worse reproductive performance, and salvage is the best economic solution if the cow is old and only an average milker.⁸

Only 1 of the postsurgical fatalities could be attributed directly to the surgical procedure, as the "home made" bar-suture pulled out and caused peritonitis. The home produced bar-sutures were initially not strong enough to withstand the pressure from the abomasum when the cow was allowed to stand. The use of "home made" sutures were discontinued when a commercially produced one became available. The cow that died from *Clostridium perfringens* toxemia shortly after bar-suture fixation might have been stressed by being positioned on her back for 10-15 minutes. The four surgical procedures which could not be completed illustrate a very important consideration with regard to this technique. If the surgeon is not sure the trocar is in the abomasum, it is recommended that the procedure be discontinued and the cow treated medically, surgically (laparotomy), or salvaged. Those cows that "ping" well when auscultated over the costal arch on the left flank are likely to have a greater abomasal distention, and the technique is more readily performed in these cases.

LDA can be treated successfully in most cases by right or left flank, or ventral paramedian laparotomy,^{9,11} Many older commercial cows, or those with several concurrent diseases do not justify an expensive procedure. For this group, where one more lactation is the prime objective, the procedure described in this report can be a logical and inexpensive alternative.

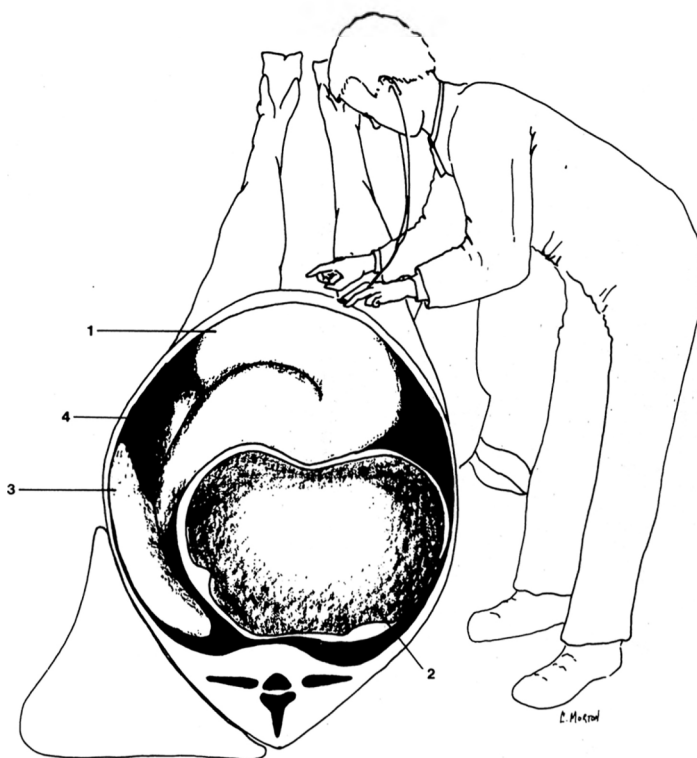


Fig. 3. Percussion auscultation of the abomasum with the cow in dorsal recumbency. 1) Abomasum, 2) Rumen, 3) Liver, 4) Omasum

suture has been placed. The second suture is inserted about 5 cm from the first suture (Fig. 9). Experience has shown that the abomasum is easiest to penetrate if the first suture is placed at the most anterior auscultated ping. Prior to removal of the cannula at the second trocarization site, abomasal gas is allowed to escape. This is done to prevent unnecessary pressure from the abomasum on the bar sutures when the cow is allowed to stand. If only one suture is desired or possible, it can be sutured to the skin. A loose knot is tied, allowing space for two-three fingers under the suture (Fig. 9) and 4 or 5 additional knots are tied to preclude knot slippage. The cow is rolled back to sternal recumbency in a clockwise direction and allowed to stand. The time required for the entire procedure is 10 to 15 minutes.

POSTOPERATIVE CARE

All cows were given procaine penicillin G 6 mill IU IM BID,^e for 3 days. All concurrent diseases were treated specifically. The cows were rechecked by the veterinarian within 4 weeks postoperatively.

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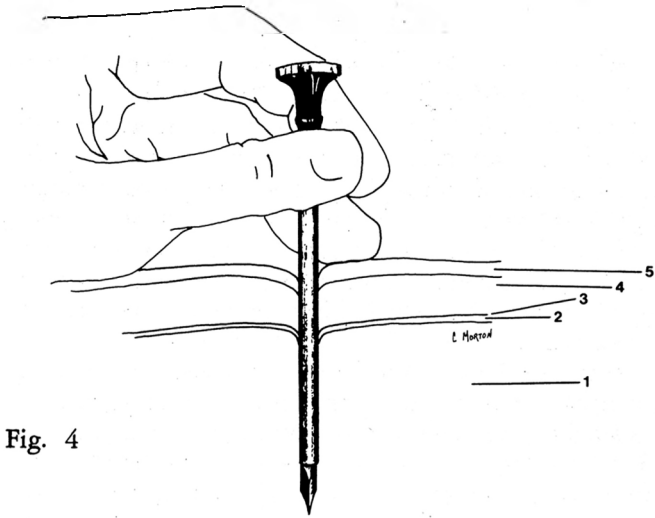


Fig. 4

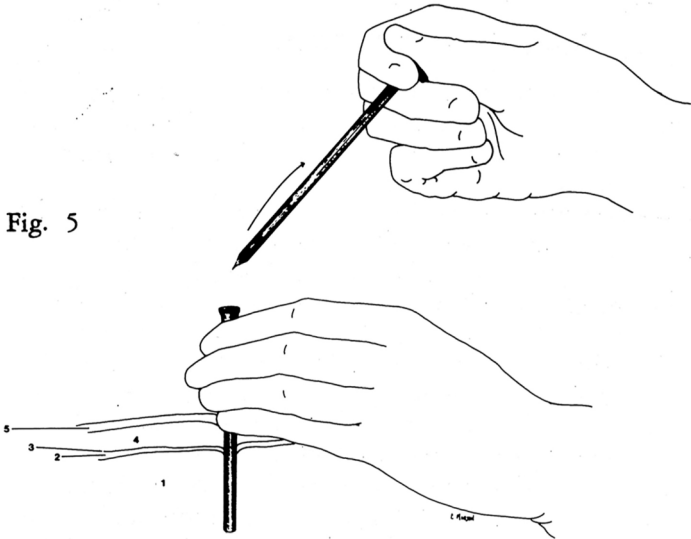


Fig. 5

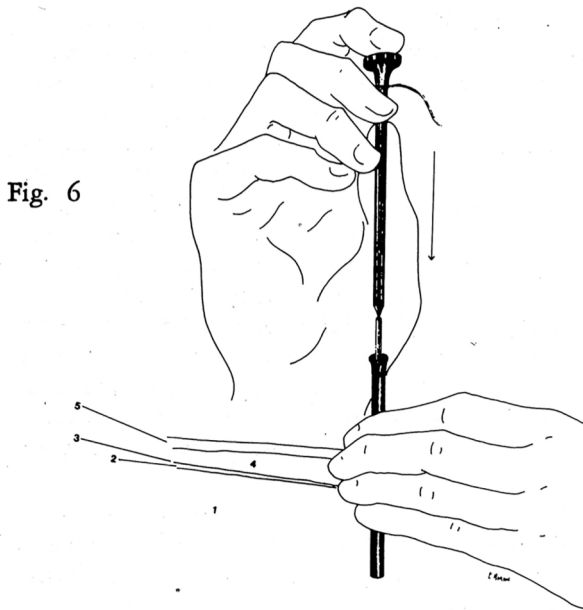


Fig. 6

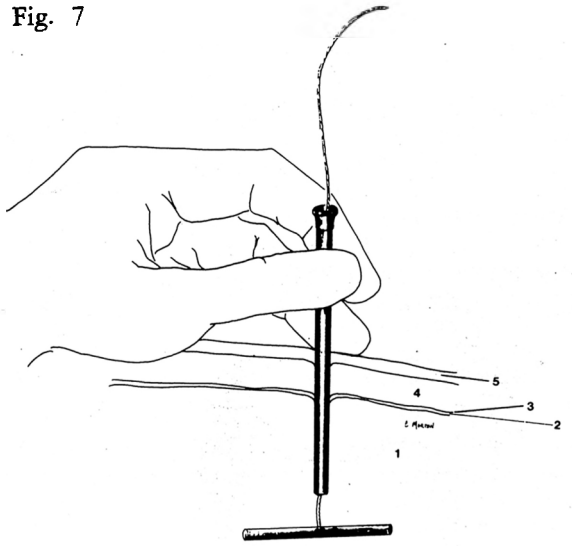


Fig. 8

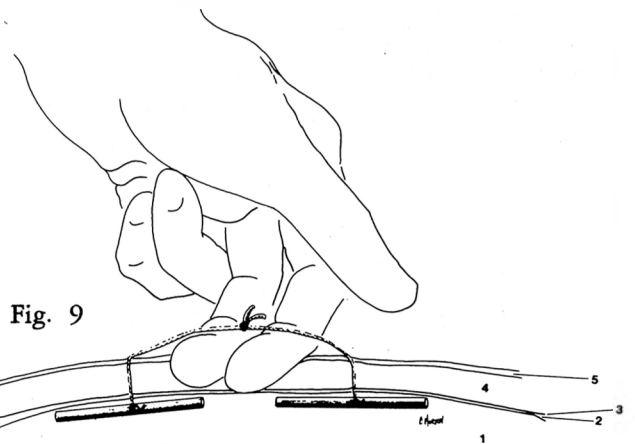
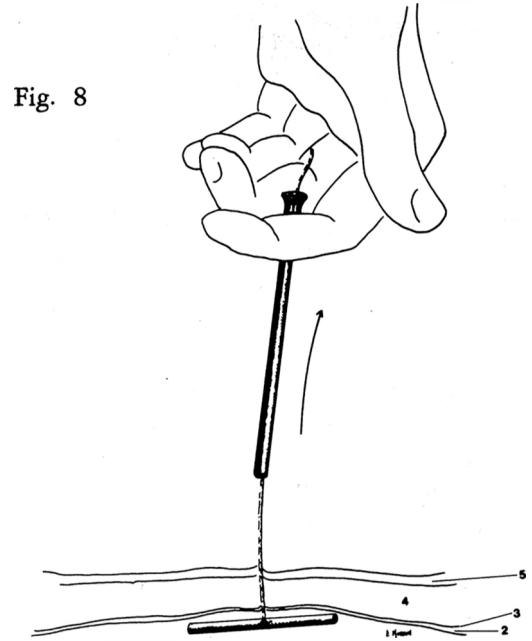


Fig. 9

Fig. 4-9. Step-by-step illustrations of placing the bar-suture in the abomasum 1) Abomasal gas cap, 2) Abdominal cavity, 3) Peritoneum, 4) Abdominal Muscles, 5) Skin

(All pictures are from J. Grymer and K. E. Sterner: Percutaneous fixation of left displaced abomasum using a bar-suture. J. Amer. Vet. Med. Assoc. 180, 12, 1982. Reprinted with permission.)

When a cost comparison is made, the beneficial effect of the bar-suture technique can be shown.

Cost:	Bar-suture (veterinarian bill)	\$	30.00
	Medication		15.00-20.00
	Withdrawal of milk for 3 days		20.00
	TOTAL COST	\$	65.00-70.00
Saved:	One average lactation of 15,000 lb. milk at \$13.50/100 lb. =		2,025.00
	Cow replacement value \$1,500-\$500 - slaughter value =		1,000.00
	TOTAL SAVED	\$	3,025.00

As demonstrated, the dairy producer can, with very little investment and relatively low risk, save \$2,000-\$3,000 when a LDA cow is saved from slaughter, and the culling can be delayed at least 1 year.

REFERENCES

1. Robertson, J.M. and Boucher, W.B., Treatment of Left Displace-

ment of The Bovine Abomasum. *J. Am. Vet. Med. Assoc.* 149, 1423-1429, 1966.

2. Pinsent, P.J.N., Neal, P.A. and Ritchie, H.E. Displacement of The Bovine Abomasum: A Review of 80 Clinical Cases. *Vet. Rec.* 73, 729-735, 1961.

3. Petty, R.D., Surgical Correction of Left Displaced Abomasum in Cattle: A Retrospective Study of 143 Cases. *J. Am. Vet. Med. Assoc.* 178, 1274-1276, 1981.

4. Lagerweij, E. and Numans, S.R., The Utrecht Procedure in The Surgical Treatment of Displacement of The Abomasum in Cattle. *Neth. J. Vet. Sci.* 1, 155-165, 1968.

5. Gabel, A.A. and Heath, R.B. Correction and Right-Sided Omentopexy in Treatment of Left-Sided Displacement of The Abomasum in Dairy Cattle. *J. Am. Vet. Med. Assoc.* 155, 632-641, 1969.

6. Weaver, A.D. Left Abomasal Displacement in Cattle. *Br. Vet. J.* 126, 194-201, 1970.

7. Grymer, J. and Ames, N.K. Bovine Abdominal Pings: Clinical Examination and Differential Diagnosis. *Compend. Cont. Educ. Pract. Vet.* 3, S311-S319, 1981.

8. Grymer, J. Displaced Abomasum — A Disease often Associated with Concurrent Disease. *Compend. Cont. Educ. Pract. Vet.* 2, S290-S296, 1980.

9. Edwards, G.B. A Review of the Surgical Treatment of Left Displacement of The Abomasum. *Vet. Annu.* 19, 61-68, 1979.

10. Smith, D.F. Treatment of Left Displacement of The Abomasum, Part I. *Compend. Cont. Educ. Pract. Vet.* 3, S415-S423, 1981.

11. Pearson, H. The Treatment of Surgical Disorders of The Bovine Abdomen. *Vet. Rec.* 92, 245-254, 1973.