

دراسات حقلية عن العلاقة بين الإصابة بالطفيليات المعوية والتغذية والعلاج في الأغنام تحت الظروف الحقلية المصرية

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الملخص

أجريت دراسات على ١٠٠ رأس من الأغنام البرى بالصحراء الغربية لجمهورية مصر العربية ثبت من الفحص المعملى اصابتها اصابة متوسطة بالطفيليات الديدانية المعوية . وقد قسمت الى اربعة مجموعات منفصلة أعطيت المجموعة الاولى والثانية عليقة مركزة من البرسيم وكسب بذرة القطن لمدة ٤٠ يوما أما المجموعة الثالثة والرابعة فقد غذيت على عليقة حافظة من الدريس والردة لنفس المدة . وقد حولت المجموعة الأولى والثالثة بمستحضر بارابندازول وتركت المجموعة الثانية والرابعة بدون علاج . ومن النتائج تبين أن الحيوانات التي تم تغذيتها على عليقة حافظة أظهرت زيادة في الوزن بالنسبة للحيوانات التي تم علاجها فقط بخلاف الحيوانات التي لم تعالج فلم تحدث بها زيادة في الوزن .

وعليه فقد أوصى الباحثون بأنه يجب علاج الأغنام علاجاً شاملاً في فصل الصيف وليس في فصل الشتاء كما هو متبع حالياً .

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From The Animal Health, Research Institute, Dokki, Cairo
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FIELD STUDIES ON THE RELATIONSHIP BETWEEN NUTRITION, TREATMENT AND PARASITIC INFECTION IN SHEEP UNDER EGYPTIAN ENVIRONMENTAL CONDITIONS

(With one table and 3 figures)

By

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SUMMARY

400 Barkey sheep from the West-Coastal desert had been examined for the gastro-intestinal parasites. Out of these one hundred animals with an average weight of 22 Kg., one year old and moderately infected with gastro-intestinal nematodes had been selected. These animals were divided into four isolated groups, each of 25 sheep. Group A and B were given a concentrated daily ration. Group C and D were fed a maintenance daily ration. Group A and C were treated with parabendazole. Egg count, fecal culture and larval differentiation had been carried out before and after treatment.

All animals kept on concentrated ration, either treated or untreated against the investigated nematodes, showed more or less a similar increase in their body weight. Animals fed on maintenance ration and treated recorded a significant increase in body weight more than their non-treated mates.

All infected animals kept on concentrated ration for 40 days, and without treatment revealed a significant increase in body weight, if compared with those treated and fed on maintenance ration.

The role played by nutrition in this study had been discussed in detail. As a conclusion, it could be advised that the proper time of massive treatment of animals in Egypt against the gastrointestinal nematodes must be carried out during the summer time and not the winter time as it is adopted uptill now.

INTRODUCTION

The relationship between nutrition and parasitic infection had been reviewed by SRICMSHAW *et al* (1959). GIBSON (1963) reviewed the interrelationship between gastro-intestinal parasites and the host. Other reports with variable results were presented by HARWOOD and LUTTERMOSER (1938) LUTTERMOSER and ALLEN (1942) FRANKLIN *et al* (1946) WHITLOCK (1949) LARSH (1951); LAURENCE *et al* (1951) RICHARDSON *et al* (1954), GIBSON (1954 a and b) EHRENFORD (1954) KATES and WILLSON (1955), SPEDDING and BROWN (1957), CHUBB and WAKLAND (1963), CHUBB *et al* (1964), ORACA and PLATT (1964) AL RABII and PLATT (1964), ROCHE and LAYRISSE (1966) and DOWNEY (1966). a

Therefore it was decided to attempt a detailed enquiry on the interrelationship between nutrition and helminthiasis in sheep under Egyptian environmental conditions taking in consideration the scheme of massive treatment done by the veterinary authorities in Egypt.

MATERIALS AND METHODS

400 Barkey sheep from the West-Coastal desert had been examined for the gastro-intestinal nematodes. Out of these one hundred animals, with an average weight of 22 Kg. and of one year old and a moderate gastro-intestinal nematode infection had been selected. These animals were divided into four isolated groups, each of 25. Animals in groups A and B were given each concentrated daily ration for 40 days consisting of 2.5 kg green fodder (Barseem), 0.5 kg hay and 0.5 kg cotton seed cakes. Those in group C and D were fed and for the same period on a maintenance daily ration consisted of one Kg dreeze and one Kg. wheat straw

Sheep of group A and C were treated with parabendazole (Methyl-5-butyl-2-benzimidazole carbamate). The drug was given orally in a concentration of 4% W/V suspension and at a dose rate of 15 mg/kg. B.W. Egg-count was done before and after giving the drug or the respective diet, using the McMaster technique (Wetzel, 1951) Faecal culture (ECKERT, 1960) and larval differentiation (BURGER and STOYE, 1968) had been carried out

Changes in the body weight were recorded every five days for a period of 45 days by using a sensitive balance (Berkel/Holland).

RESULTS AND DISCUSSION

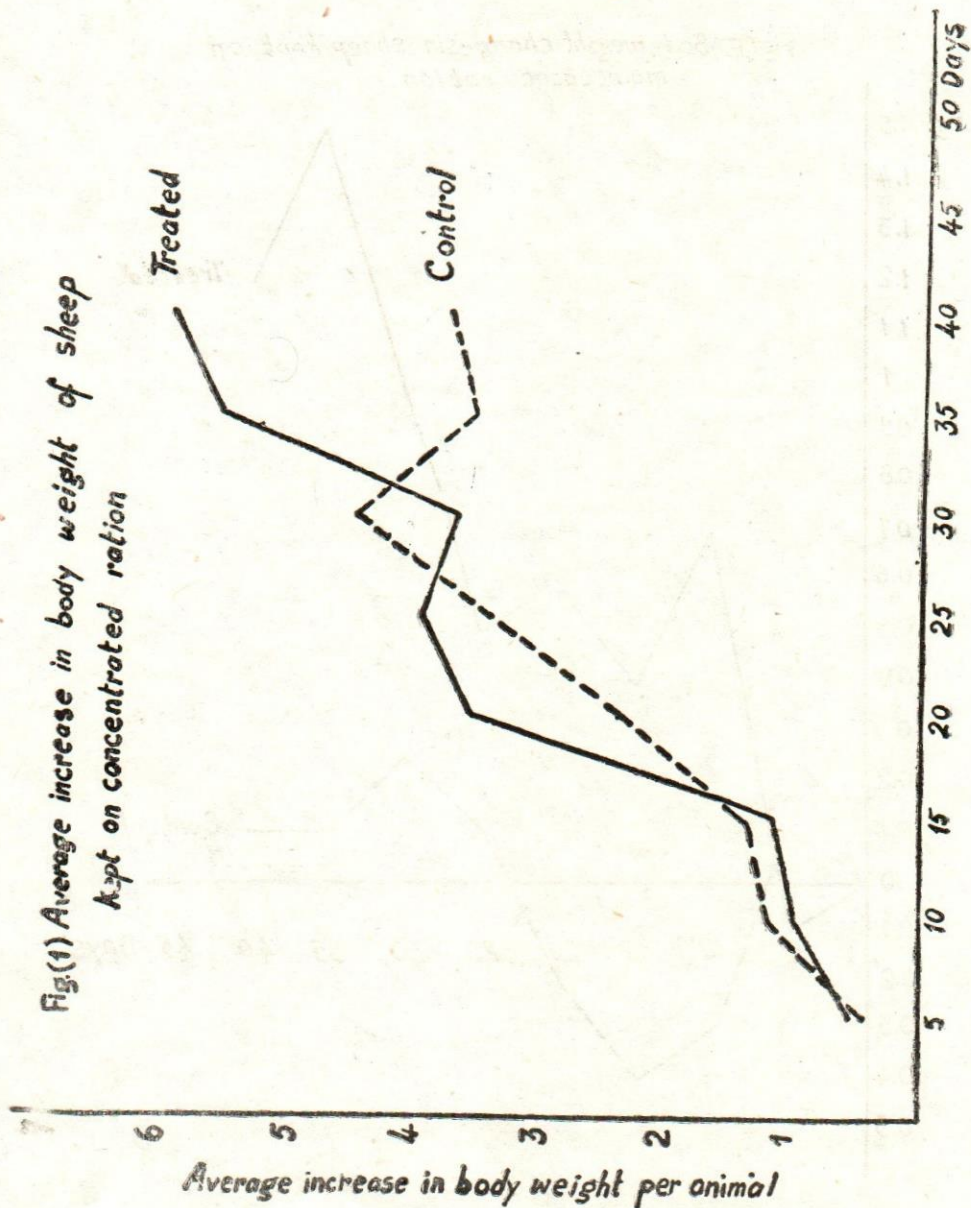
Faecal examination of the animals under investigation revealed that they were free from liver flukes, coccidia, lung worms and external parasites but infested with nematode parasites.

Faecal egg count of sheep chosen for this study was about 900 eggs per gram faeces indicating a moderate infestation. Larval differentiation proved that the experimented animals were infested with *Haemonchus* species, *Nematodirus* species, *Trichostrongylus* species, *Strongyloides* species, *Chabertia ovina* and *Oesophagostomum* species at a percentage of 18%, 12%, 30%, 15% and 25% respectively. On the 3rd, 7th and 15-day post-treatment over 95% of the gastro-intestinal nematodes were eliminated from the treated groups (table 1). On the other hand the non-treated one showed more or less constant egg output.

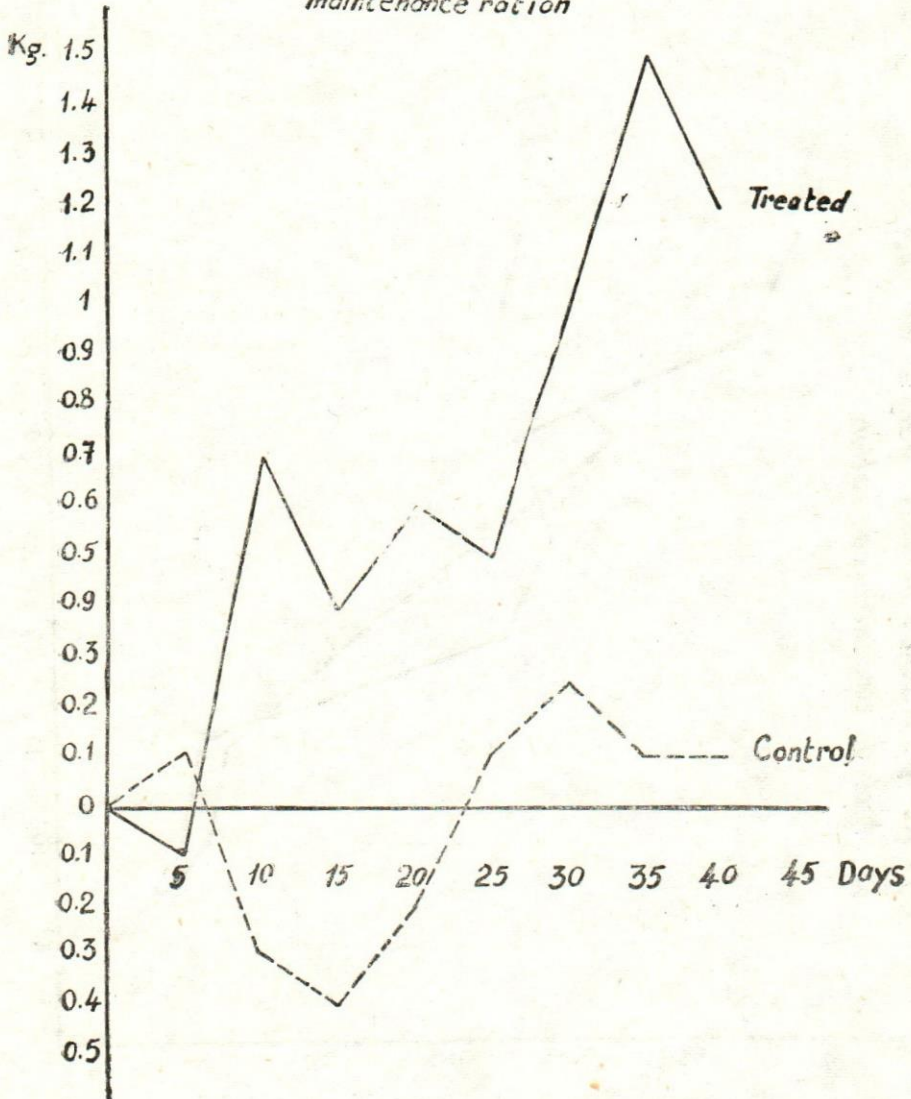
In this study all animals kept on concentrated ration for 40 days either treated or not against the investigated nematodes showed more or less a similar significant increase in their body weight (Fig II). However, in treated animals fed on maintenance ration the gain in body weight was more significant than their non treated mates (Fig III).

The most interesting results in this study was that, all infected animals kept on concentrated ration and without treatment revealed more significant increase in body weight, if compared with those treated and fed on maintenance ration. These results were in agreement with those obtained by GIBSON

Fig.(1) Average increase in body weight of sheep kept on concentrated ration



Fig(II) Body weight changes in sheep kept on maintenance ration



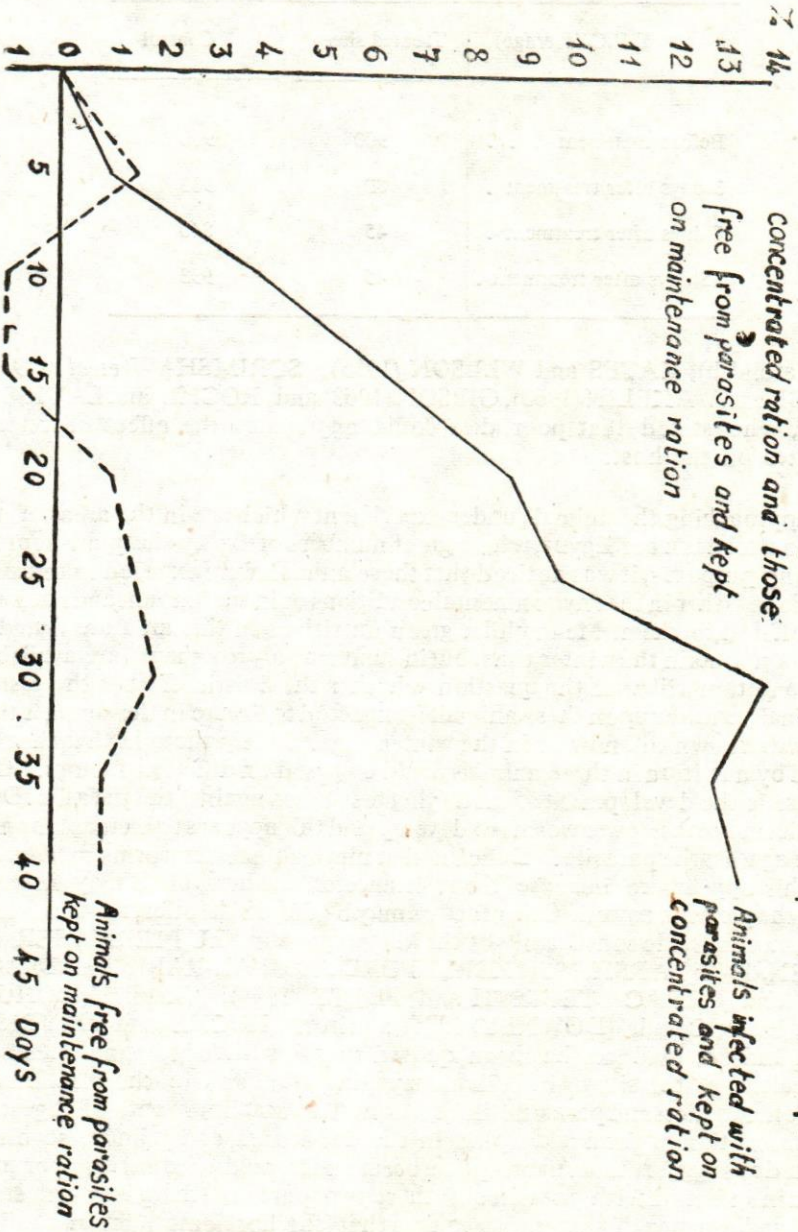


Fig.(III) Changes in body weight of animals infected with parasites and kept on concentrated ration and those free from parasites and kept on maintenance ration

TABLE 1. Faecal egg count (E. P. G.) in treated and control sheep

E.P.G.(average)	Treated sheep	Control
Before treatment . . .	900	900
3 days after treatment .	80	933
7 days after treatment .	45	840
15 days after treatment .	45	933

(1954 a and b), KATES and WLLSON (1955), SCRIMSHAW *et al* (1959), CHUBB and WAKELIN (1963), GIBSON (1963) and ROCHE and LAYRISSE (1966), who stated that poor diet could aggravate the effect of certain parasites on the host.

Approaching the animals under experiment which are in the areas of the west-coastal desert of Egypt, where great numbers of Barky-sheep are kept for breeding purposes, it was noticed that these animals were exposed to seasonal variations either in the environmental conditions or in the amount and nature of food offered to them. Meanwhile, green nutritives in this area are found in ample amounts in the winter time, but in summer only roughages are available. This condition will arise the question whether the drastic effect of the gastrointestinal parasites upon these animals is expected to occur in the summer time as it was known till, now or in the winter time. So it is thought that the role played by nutrition in these animals could be based on different factors. One of these is the development of modifying resistance against the parasite. Deficient diet may cause fewer worms to develop and this appears to increase the resistance against the parasite. Deficient diet may cause fewer worms to develop and this appears to increase the resistance of the host, but it may, in fact it affect the parasite as well. Other factors may be due to the effects of deficiencies of the more specific constituents of the diet as protein (LUTTERMOSER and ALLEN, 1942; LARSH, 1951. HERENFORD, 1954; AL-RABII and BLATT, 1964 and ORRACA TETTETH and PLATT, 1964); Vitamin A (CHUBB *et al*, 1964); Cobalt (DOWNEY, 1966) and iron (ROCHE and LAYRISSE 1966). Indeed, evidence has been quoted to show that intestinal function, particularly at the site of infection, may play also a role on the relationship between nutrition and parasitic infestation. The maximum rate of digestion and absorption of food takes place in the duodenum and jejunum so one is tempted to suggest that malabsorption occurs and would account for poor utilization in infection with parasites of these two parts of the gastro-intestinal tract, and thus each infection requires that the host eats more per unit of weight gained more than does a normal animal (ANDREWS *et al* 1944; CAUTHEN and LANDRAM, 1958). On the other hand, HOLMES and DARKE (1959) showed that mild infections has no effect upon absorption

and utilization of food as it did not seem to matter whether the parasites are in the abomasum, in the small intestine or in the large bowel; but differences in the diet of the hosts as well as their nutritional status may be important. This latter conclusion was in agreement with the results pointed out in this study. However it was shown that derangements of digestion and absorption were relatively unimportant and it was necessary to look more closely at the general metabolic functions, as has been suggested by the experiments of ANDERWS (1938), ANDERWS *et al* (1944) and ALRABII and PLATT (1964). Therefore, from the above mentioned arguments, it could be concluded that the nutritional status of the host in any experimental or field observations must be considered. Differences of nutrition may well account for some of the conflicting reports of the effect of parasitism on the host as well as of the antihelminthics on the parasites. On the other hand, it might not be forgotten, that some infections at least can overcome the best fed animals, and that there was evidence that even subclinical infections may depress the growth or production of these hosts.

On consequence to the data recorded here, it could be advised that the proper time of massive treatment of animals in Egypt against the gastro-intestinal nematodes, must be carried out during the summer time due to the deficiencies in the nutritive of the offered food and not in the winter time as it is usually adopted up till now, where the food offered to the animals was rich in its nutritive constituents.

REFERENCES

- Al-Rabii, H.A., and platt (1974). Effect of chronic roundworm infection (*Toxocara canis*), on protein metabolism in dogs given diets of different protein value. *Proc. Nutr. Soc.* **23**, IV.
- Andrews, J.S. (1938). Effect of infestation with the nematode *Cooperia curticei* in the nutrition of lambs. *J. Agr. Res.*, **51**, 349-361.
- Andrews, J.S., Kaufman, W., and Davis, R.E., (1944). Effects of the intestinal nematode, *Trichostrongylus clubiformis*, on the nutrition of lambs. *Amer. J. Vet. Res.*, **5**, 22-29.
- Bürger, H.J., and Stoye, H., (1968). Parasitologisches Diagnostik (Teil II). Therapogen praxis Dienst.
- Cauthen, G.E., and Landram, J.F. (1958). The effect of experimental infection with *Ostertagia ostertagi* and *Trichostrongylus axei* in calves on weight gain, feed consumption and feed utilization. *Am. J. Vet. Res.*, **19**, 811-814.
- Chubb, L.G., and Wakelin, D. (1963). Nutrition and helmenthiasis in chickens. *Proc. Nutr. Soc.* **2**, 20-25.
- Chubb, L.G., Freeman, B.M., and Wakelin, D. (1964). Effect of *Capillaria obsignata* Madsen 1945, on the vitamin A and ascorbic acid metabolism in the domestic fowl. *Res. Vet. Sci.*, **5**, 154-160.
- Downey, N.E., (1966). Some relationships between trichostrongylid infestation and cobalt status in lambs. II *Trichostrongylus axei* infestation. *Brit. Vet. J.* **122**, 201-208.

- Eckert, J. (1960). Die Diagnose des Magen-Darmstrongyloiden befalltes des schafes durch differenzierung des freilebenden dritten larven. *Zbl. F. Veterinarmedizin; Bd. VII, Heft., 6.* 612-630.
- Ehrenford, F.A. (1954). Effects of dietary protein and the relationship between laboratory mice and the nematode *Nematos piroides dubius*. *J. Parasitol.* **40.** 486.
- Franklin, M.E., Gordon, H. Mcl., and Mac-Gregor, C.H., (1946). A study of nutritional and biochemical effects in sheep of infestation with *Trichostrongylus colubriformis*. *J. Counc. Sci. Indust. Res., Australia., 19.* 46-60.
- Gibson, T.E., (1954 a). Studies on *Trichostrongylus axei*, I the pathogenesis of *Trichostrongylus axei* in sheep maintained on a low plane of nutrition. *J. Comp. Pathol. Therap., 96.* 127-140.
- Gibson, T.E., (1954 b). Studies on *Trichostrongylus axei*, II the pathogenesis of *T. axei* in sheep maintained on a high plane of nutrition. *J. Comp. Path. Therap.* **46.** 360-370.
- Gibson, T.E., (1963). The influence of nutrition on the relationships between gastro-intestinal parasites and their hosts. *Proc. Nutr. Soc., 22.* 15-20.
- Harwood, P.D., and Luttermoser, G.W., (1938): The influence of infections with Tape worms *Raillietina cesticillus* on the growth of chickens. *Proc. Helminthal. Soc. Wash., 5.* 60-62
- Holmes, E.G., and Darke, S.J., (1959): Malnutrition in African adults. 4. Intestina absorption. *Brit. J. Nutr., 13.* 266-277.
- Kates, K.C., and Wilson, G.I., (1955). Effect of two rations differing primarily in protein, carbohydrate and crude fibre content on experimental haemonchosis in lambs. *J. Parasitol.* **41,** Supp. 43.
- Larsh J. E., (1951). Host-parasite relationships in cestode infections, with emphasis on host resistance. *J. Parasitol., 37.* 343-352.
- Laurence, G.B., Groenwald, J.W., Quin, J.I., Clark, R., Ortlepp, R.J., and Bosman, S.W. (1951). The influence of nutritional level on verminosis in Merino Lambs. *Onderstepoort J. Vet. Sci. Animal. Ind., 25.* 121-132.
- Luttermoser, G.W., and Allen, R.W., (1942). Influence of dietes high and low in protein on the growth of chickens infected with Tapeworm *Raillietina cesticillus*. *Poult. Sci., 21.* 111-115.
- Orraca, Tetch, R., and Platt, B.S., (1964). Effects of hookworm infestations (*Nippostrongylus muris*) on protein metabolism in rats. *Proc. Nutr. Soc., 23.* 111.
- Richards, R.M., Schumard, R.F., Pope, A.L., Phillips, P.H., and Herriks, C.A., (1954). Effect of phlebotomy versus stomach worm, *Haemonchus contortus*, infection on the growth and certain blood constituents of lambs. *J. Animal Sci., 13.* 274-282.
- Roche, M., and Layrisse, M., (1966). The nature and causes of hookworm anaemia. *Am. J. Trop. Med Hyg., 15.* 1030-1102.
- Schrimshaw, N.S., Taylor, C.E., and Gordon, J.E., (1959). Interactions of nutrition and infection. *Am. J. Med. Sci., 237.* 367-403.
- Spedding, C.R.W., and Brown, T.H., (1957). Study on the clinical worm infestation in sheep. III The effect on wool production. *J. Agr. Sci.* **49.** 229-233.
- Wetzel, R., (1951). Verbesserte Mc-Master Kammer Zum Auszahlen von wurmeiern. *Tierarztl. Umschau., 6.* 209-210.
- Whitlock, J.H., (1949). The relationship of nutrition to the developemnt of the *Trichostrongylidoses*. *Cornell Vet.* **39.** 146-182.