GENERAL DISCUSSION

J. Armour *(UK)*

I would like to ask Dr. Jones, what were the numbers of tracer calves used, per acre or per hectare,

R.M. Jones *(UK)*

We used approximately one tracer calf per hectare in the studies.

A. Kloosterman *(The Netherlands)*

We have had interesting experiences with tracer calves. We place them two by two in a field where we have also done larval counts. We found a satisfactory correlation between herbage counts and wormburdens, but there may be big differences between the worm counts of the two calves grazing on one particular pasture. For example, a first calf had 100 worms and the second calf, grazing the same pasture simultaneously, had 81 000 worms! To minimise the variation between calves, these were calves that were all from one sire. Later, it was observed that some animals graze closer to the faecal pats than others, and hence grazing behaviour may play an important role in the acquisition of larvae.

J.-P. Raynaud *(France)*

I would like to refer to an experiement which was done on two paddocks. Each paddock was of one hectare and each had ten grazing animals, according to the normal system that we have in Normandy. On these two paddocks we put tracers every month. We calculated L_3 /kg herbage and the total amount of the worm count, irrespective of developmental stage, for both *Ostertagia* and *Cooperia*. Also, we have calculated the herbage dry matter intake per day and have estimated the total hypothetical intake of L_3. There was a large discrepancy between the potential intake of larvae and the number of worms in the tracer animals when the numbers were very low. However, when the numbers were

high there was only a small discrepancy between the total intake of larvae and the wormburden. Our conclusion is that, in the second half of the grazing season, the tracer animal reflects satisfactorily to the herbage count. However, in the early part of grazing, the herbage probably shows more larvae than the tracer acquires. On some occasions there was a good correlation between the total possible intake and the real intake of the calves.

N. Downey *(Ireland)*

The level of pasture contamination is important. At low levels the pasture sampling techniques are not very good at showing differences. Then it may be better to use egg counts of susceptible animals.

R.M. Connan *(UK)*

I would like to refer to the difference in the correlation between pasture larvae and wormburden in tracer animals in the second half of the season, compared with the correlation in the first half. This may be related to the amount of herbage which is available. When the herbage is growing, and it is reasonably plentiful and reasonably nutritious, animals can be fairly selective. As the herbage becomes less nutritious and less readily available, then they can be less selective in their grazing. This is certainly my experience with sheep.

R.M. Jones

I would agree with Dr. Connan. Additionally, distinct differences may occur in grazing behaviour when a strange animal is placed in a herd. Even when the age and sex of the animal are matched with the grazing herd, even then new arrivals may be isolated and it may be a long time before they are accepted into the grazing herd. Therefore, they do not necessarily reflect the precise intake of the animals of the main herd.

J. Armour

On the other hand, if Dr. Michel's L_3 data in the 60s is compared with our data on tracers, done at the same time in a different part of Britain, there is a close relation to both sets of data. Therefore, in view of what was presented this morning, both methods are good indicators of parasitism.

J.F Michel *(UK)*

There was a great deal of talk about techniques this morning but people were reluctant to relate these techniques to specific purposes. Surely, what technique you choose does depend very much on the specific purpose to which you wish to put it?

I am also wondering whether one needs the degree of precision that people seem to be aiming at. The outlines being looked for are broad and does it matter if there is some imprecision?

R.J. Jørgensen *(Denmark)*

I think precision is important in some circumstances. I have presented some data on the horizontal distribution of lungworm larvae. If the trichostrongyle larvae are counted in the same samples, an equally uneven distribution of these larvae is noted. In an experiment last year between two groups of calves - one group was treated and the other untreated - we found pasture larval counts which were the same both close to the pat and away from the pat in one field, but on another field, where there was a control group, there was a very high concentration around the faecal pats and a very low concentration away from faecal pats. I wonder what kind of counts we would have got had we just taken random samples from these two fields.

E.J.L. Soulsby *(UK)*

We have heard papers on how to measure infective larvae and other larvae in herbage and soil, and this has been correl-

ated with the numbers of worms found in tracer animals. Of course there is a large area of unknown between the situation in the soil or on the herbage and the occurrence of the adult worm in the animal. I wonder if any worker has thought of trying to assess the number of larvae ingested, for example, by an oesophageal fistula. How many larvae are taken in but never mature?

J. Armour

I think that Bill Southcott, and his colleagues at Armidale, used oesophageal fistulae. However, this raised problems in relation to appetite. They did not attach too much importance to the results they got using the technique of oesophageal fistulation.

R.J. Thomas *(UK)*

It is a question of how normal the animal is once it has been prepared for an oesophageal fistula.

P. Nansen *(Denmark)*

Last summer we tried to make a compromise between herbage larval counts and wormburdens in animals. The idea was to take samples by fistulae from the rumen of grazing animals.

There are differences between having an oesophageal fistulae and a rumen fistulae because grazing with a ruminal fistula does not seem to effect the animal very much.

However, we could not recover the larvae from the rumen for technical reasons. Nevertheless, it may be worthwhile to study this method further since it would be cheaper, probably, than tracer calves.