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A comparison between lamb drafters and the Phillips Fat Displacement Meter (PFDM) for predicting GR, hot carcass weight and class in live lambs

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ABSTRACT

A trial was undertaken in which 11 meat company lamb drafters estimated the GR carcass fatness, hot carcass weight and carcass class on 26 live lambs. In addition the Phillips Fat Displacement Meter (PFDM) was used to estimate GR fatness of these live animals. The average hot carcass weight of the lambs was 21.9kg and mean GR on the left and right sides were 14.2mm and 14.5mm respectively. The best two drafter estimates correlated more highly (0.89 and 0.83) than the PFDM (0.81) with lamb carcass GR (mm) on the left sides of these carcasses. On the right sides these two drafters correlations were respectively 0.91 and 0.84 while the PFDM correlation was 0.85. The correlations of the poorest drafter were 0.62 and 0.57 for the left and right sides, respectively. While the best drafters were accurate in ranking live lambs for fatness, in absolute terms all drafters underestimated GR on average by 2.2mm whereas the PFDM underestimated by 1.1mm on the left side and 0.8mm on the right. So for actually drafting lambs for slaughter, the PFDM is less likely to select lambs in the penalty payment ranges, or is more likely to select lambs before they reach these penalty fatness levels than the company drafters. These results highlight the need for drafter training courses with feedback on their results. On average the drafters underestimated carcass weight by 4.0kg.

Keywords Lamb fatness, GR estimation, drafters, fat displacement meter, grading.

INTRODUCTION

Simple and accurate methods for ranking young rams (and ewes) for fatness as a basis for selection of leaner animals for breeding purposes and flock replacements are needed. Bass *et al.* (1982) reported that the best skilled livestock judges are as accurate as ultrasonic probes for ranking sheep for fatness.

The fatness of lamb carcasses is specified for classification purposes by the GR measurement, a total tissue depth taken in mm between the surface of the carcass and the 12th rib at a point 11cm from the midline. Carcasses with GR values of over 12mm receive quite heavy payment discounts (Econ. Serv. 1990) making it desirable for farmers to avoid getting lambs into the fatter T and F classes which have the larger GR measurements.

The normal method of selection of lambs for slaughter is through the use of meat company drafters who pick the lambs to be slaughtered by sight, and on occasion touch. Lamb drafters need to be able to recognise live lambs with the larger GR measurements so that they can draft them for slaughter before they

reach the penalty payment levels or separate out the lambs that are too fat so that the farmer can attempt to reduce their fatness. In order to assist farmers and drafters to recognise the relative fatness of live lambs, a fat displacement meter designed to measure fat depth/displacement at the GR site was developed by the late Evan Phillips, DrD.S.M. Phillips and Mr A.E. Uljee. The present trial compared this Phillips Fat Displacement Meter (PFDM) with lamb drafters for accuracy of predicting GR in live lambs.

MATERIALS AND METHODS

Animals

Twenty six woolly lambs ranging in liveweight from 33 to 56kg were available for this trial. They were selected by a lamb drafter as being at the fat end of a commercial line of lambs.

Drafters

Eleven drafters from one meat company attended to

TABLE 1 Relationships between either drafter estimated GR or PFDM (left or right side) estimated GR on 26 live lambs and measured GR (mm) on both sides of their carcasses.

Drafter No.	Drafter ^a estimate GR (mm)	Prediction of GR left side (Estimate - actual) at:			Prediction of GR right side (Estimate - actual) at:		
		r ^b	12mm	15mm	r ^c	12mm	15mm
1	13.1	0.89	-0.43ns	-1.28	0.91	-0.50ns	-1.56
2	11.4	0.83	-2.31	-2.90	0.84	-2.37	-3.22
3	11.9	0.77	-1.20	-2.69	0.81	-1.27	-2.88
4	11.3	0.75	-1.96	-3.19	0.72	-1.93	-3.44
5	12.0	0.75	-1.73	-2.37	0.77	-1.83	-2.68
6	12.3	0.73	-1.63	-1.93	0.74	-1.72	-2.29
7	12.7	0.71	-0.47ns	-1.85	0.69	-0.45ns	-2.08
8	12.1	0.71	-1.11	-2.46	0.77	-1.25	-2.66
9	12.9	0.68	-0.49ns	-1.63	0.71	-0.60ns	-1.86
10	10.9	0.64	-2.24	-3.73	0.71	-2.39	-3.91
11	12.2	0.62	-0.34ns	-2.54	0.57	-0.31ns	-2.66
Mean bias			-1.26	-2.42		-1.33	-2.66
Left GR ^d	14.2						
Right GR	14.5						
PFDM left	13.0	0.81	-0.43ns	-1.38			
PFDM right	13.7				0.85	0.14ns	-1.00

^a An overall figure ignoring possible side differences; ^b Overall drafter estimate correlated with left side carcass GR; ^c Overall drafter estimate correlated with right side carcass GR; ^d Measured on carcass

demonstrate their skills and observe and try out the PFDM. It was interesting to note, that although the GR system of carcass class definition incorporating penalties for T and F grades had been in operation since the beginning of the 1985/86 season, by May 1990 the drafters were still not thinking in terms of GR values in live lambs and they required a table giving the GR values for the different export carcass grades at the start of the exercise so that they could put GR values on their estimated carcass grades. They did have a mental picture of the class of lamb going into the different export fat classes. They were also asked to estimate the hot carcass weight and the export grades of the 26 lambs. Assessments were made the afternoon before slaughter.

PFDM Readings

The PFDM is a device with banks of tines designed to match the spacing of three adjacent ribs. When pressure is applied, the fixed outside tines sit on the rib they are placed above. The middle tines are movable and are displaced by the tissue above the middle rib, but are held on the skin surface by slight spring pressure. An experienced operator took PFDM GR readings on both sides of the 26 live lambs at a site over the 11th or 12th ribs around 11cm from the spinal column.

Carcass Measurements

The lambs were slaughtered the following morning, carcasses were weighed and GR was measured by an experienced operator using a GR probe callibrated in

TABLE 2 A comparison over the first 13 (unselected results from the 26) lamb carcasses of their fat classes as called by an export grader, as predicted by the mean GR measurements (from both sides) and as called by the 11 lamb drafters.

Lamb No.	Export grader fat class	Measurement fat class	Number of drafters calling the carcass as		
			F	T	Other
1	F	T	0	1	10
2	F	F	2	3	6
3	P	P	0	0	11
4	F	F	10	1	0
5	F	F	4	3	4
6	F	T	0	2	9
7	F	T	0	4	7
8	F	F	6	4	1
9	F	F	1	9	1
10	P	P	0	0	11
11	P	P	0	0	11
12	F	F	6	4	1
13	T	T	1	0	10

mm. An experienced export carcass grader placed an export grade on all carcasses.

RESULTS AND DISCUSSION

The drafters mean estimates of overall GR (usually calculated back from their carcass grade estimates) are given in Table 1. The best drafter GR mean was 1.2mm below the overall carcass average mean GR and the worst drafter averaged 3.4mm below the carcass mean. On average, the drafters underestimated GR by 2.2mm. This is an improvement on drafter performance in a trial conducted just after penalty payments had been introduced for T grade lambs near the end of 1985 when the average underestimate of GR by 38 drafters was 4.2mm (Kirton *et al.*, 1991). The PFDM left side measurement on average underestimated the carcass left side GR by 1.1mm and the right side PFDM reading underestimated right side GR by 0.8mm. Thus the PFDM measurement was closer on average to the carcass GR value than the drafter estimates.

A difficulty with the present research and clearly a difficulty faced by the farming community results from the lack of absolute standards against which to judge the accuracy of either lamb drafters, devices such as the PFDM or carcass graders. Visual assessments of

carcass graders did not always lead to carcasses being placed within the GR specifications defined in the grade standards. Furthermore, when measured, GR measurements on the left side sometimes result in the placement of a carcass in a different fat class from that if the measurement was made on the right side.

The best drafter was able to rank the lambs slightly better for relative fatness (as indicated by carcass GR) than the PFDM (left or right sides) as indicated by the *r* value (Table 1). Ability to rank lambs for fatness may be of importance to ram breeders. A comparison of the value of GR predicted by each drafter or the PFDM with the actual carcass values at 12 and 15mm (critical readings for assessing carcass class) is also given in Table 1 as this is of importance to export lamb producers. Whereas drafter1 only underestimated carcass GR by a small and similar amount to the PFDM, most other drafters underestimated carcass GR at 15mm (on the right side in particular) by 2-4mm. This means that many carcasses with a F grade level of fatness would be drafted for slaughter as T's or even P's, a costly mistake as far as the farmer is concerned.

An indication of how the lamb grader's class compared with actual carcass measurements and how the drafters compared with both methods of assessing carcass fatness is given in Table 2. The 13 lambs with

TABLE 3 Relationship between drafter estimated hot carcass weight (HCW-kg) and measured HCW at slaughter (drafters numbered as in Table1).

Drafter ^a No.	Drafter estimate HCW (kg)	r	Rank ^b	Deviations of predicted HCW from actual HCW (kg) at:	
				17.1kg	21.3kg
1	18.8	0.75	8	-0.6ns	-2.8
2	16.8	0.86	1	-2.6	-4.8
3	17.8	0.75	7	-1.4	-3.8
4	17.1	0.81	2	-2.1	-4.5
5	17.4	0.80	6	-1.6	-4.2
6	17.2	0.81	3	-2.1	-4.4
7	17.7	0.81	4	-1.3	-3.8
8	20.8	0.80	5	0.2ns	-1.0
9	19.0	0.53	11	0.4ns	-2.5
10	17.3	0.68	10	-2.0	-4.2
11	16.6	0.74	9	-1.7	-4.9
HCW ^c	21.9				

^a Numbered in order for accuracy of ranking lambs for carcass left side GR; ^b Numbered in order of accuracy of ranking lambs for relative carcass weights; ^c Carcass weights recorded immediately following slaughter

lowest numbered ear tags have been used for illustrative purposes. For the purposes of this table Y and P class carcasses have not been distinguished as a drafter error in calling these classes is unlikely to financially penalise a farmer. However, calling an F or T class carcass as something leaner (a P or Y) has larger economic consequences for the producer as F and T carcasses are markedly lower valued.

The 11 drafters had no difficulty in picking the less fat carcasses (No's 3, 10, 11) assisted by their tendency to underestimate GR. One very fat lamb (4) was picked by all drafters. However lambs 1 and 13 in the penalty payment zone were missed by 10 of the 11 drafters and the majority miscalled lambs 2, 6 and 7. Such results are likely to be of concern to farmers with fatter lines of lambs to draft or who wish to have lambs drafted before they reach the penalty classes in terms of carcass payments.

The skills of drafters in estimating hot carcass weight are shown in Table 3. Although ability to rank lambs for relative fatness may be of some importance to ram breeders, the ability to rank lambs for relative

carcass weight is less so as most sheep breeders will own a set of scales for measuring liveweight. The results in Table 3 show that the drafter who was best for predicting GR ranked only 8th for placing lambs in order of carcass weight. The drafter who came 2nd for ranking lambs for GR was best for ranking them for carcass weight. The least accurate three drafters for ranking lambs for GR were also least accurate for ranking them for carcass weight.

Of greater importance for farmers is the abilities of drafters to pick likely carcass weights of the mobs they are drafting for slaughter. On average, they underestimated the carcass weights of these 26 lambs by 4.0kg. The predictions in Table 3 show that while 3 of the drafters were reasonably accurate in estimating carcass weights at the 17.1kg class boundary (the lower weight limit of the weight class above the M weight range), the underestimate of carcass weight had increased for all drafters at 21.3kg (the lower weight limit of the PH class).

The results of this trial confirms those from an earlier trial (Kirton *et al.*, 1991) indicating that there is

considerable scope for improving drafter performance. Hopkins (1988) indicated that experienced operators can achieve a high level of accuracy in assessing lamb carcass fatness for marketing systems such as CALM, and trading to specification, as being undertaken in Australia and currently being introduced into NZ. The known improvements that can arise through drafter/carcass classer training suggests the desirability of export meat companies organising drafter training and organised feedback systems as a method for improving drafter performance. One obvious improvement noted was a reduction in the level of GR underestimate by drafters from 4mm in 1985 to 2mm in the present trial. However, the carcass underestimate increased from 1.6kg in 1985 to 4kg in the present trial possibly partly explained by the heavier carcasses in this latest trial.

While the PFDM appears to show promise as a device to assist lamb drafters assess levels of GR fatness

on live lambs and to assist ram breeders rank their young rams for fatness for selection purposes, further trials are needed to confirm the present results before this device can be recommended.

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