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CONFORMATION ASSESSMENT OF LAMB CARCASSES AND MEASUREMENT USING VIAscan®

D. L. HOPKINS [A], E. SAFARI [AB] and N.M. FOGARTY [C]

[A] NSW Agriculture, PO Box 129, Cowra, New South Wales 2794, Australia
[B] 73 Mawson Parade, Chifley, NSW, 2036, Australia
[C] NSW Agriculture, OAI, Orange, NSW 2800, Australia

SUMMARY
EUROP conformation score was assessed by two assessors on 635 lamb carcasses from a diverse range of genotypes. Differences between mean scores were found across measurement days with an overall correlation of r = 0.54 between scores of the two assessors. Carcass weight and GR were both significant as covariates such that as they increased (ie as carcasses became heavier and fatter) the EUROP scores decreased (ie less P's and O's). In a separate experiment based on 426 lamb carcasses from diverse genotypes it was shown that three different VIAscan® measures could be used to predict EUROP scores (R^2 = 58.4, r.s.d. = 0.53) independent of fat measures. Indications are that VIAscan® could be used to provide objective assessment of EUROP scores. However a more robust approach would be to define classes for shape according to VIAscan® measures using say industry agreed standards and then online prediction would be very accurate.

Keywords: lamb, conformation, EUROP, VIA

INTRODUCTION
Lamb carcass description in Australian AUS-MEAT accredited abattoirs is based on hot carcass weight and fatness, using a probe to measure tissue depth at the GR site (Hopkins *et al.* 1995). Measurement of GR allows prediction of saleable meat yield, indicates the amount of trimming required and the likely yield of traditional or trim lamb cuts (Hopkins *et al.* 1994). Producers and meat traders also consider conformation (shape), an important trait and argue that it should be included in the Australian description scheme for lamb (Hall *et al.* 1994). At least one abattoir in NSW now scores carcasses for conformation within a Branded lamb alliance using the five score EUROP system (De Boer 1992) and price penalties are attached to EUROP scores, O and P. The difficulty is that current use of the EUROP system relies on the subjective appraisal of carcasses. In this paper we compare scores for carcasses assessed by two different people to examine the impact of 'assessor' on scores and then present data to show the extent to which VIAscan® can be used to predict EUROP scores.

MATERIALS AND METHODS
Experiment 1
Conformation of 635 carcasses was scored independently by 2 assessors over 3 slaughter days. The EUROP conformation system was used where E is 'best' conformed and P is 'worst' conformed. For this system reference photographs are used to allocate scores. The carcasses came from different genotypes (Merino x Merino through to a range of first crosses including Border Leicester x Merino, White Suffolk x Merino and East Friesian x Merino). Hot carcass weights (HCW) were recorded and the GR measured (total tissue depth over the 12th rib 110 mm from the midline) using a GR knife.

Experiment 2
In a separate experiment, VIAscan® measurements were obtained on the slaughter chain for 426 carcasses from Merino, first cross (eg Border Leicester x Merino) and second cross (eg Texel x Border Leicester x Merino) lambs over a 2 week period. VIAscan®, which uses video image analysis, has been developed by Meat & Livestock Australia and is described in detail by Hopkins (1996). The VIAscan® measurements include dimensional aspects of the carcass and also colour variation at selected positions. The system recognises the bottom of the gambrel where it passes through the Achilles tendon. This was used as the reference for all linear dimensions as was the most distal junction of the hindlegs where the m.*semimembranosus* muscles meet (groin), and the distal end of the neck equivalent to the atlanto-occipital articulation. Each carcass was weighed hot (HCW) and

the GR was measured using a GR knife. A different assessor to those who did the scoring in the first experiment performed EUROP carcass conformation scoring.

Statistical analysis

For experiment 1, EUROP scores were analysed using analysis of variance (GenStat 5.4.1, 2000) where the effects were assessor (1 or 2), slaughter group (1, 2 or 3) and the first order interaction. Both HCW and GR were included as covariates.

The correlation between EUROP scores in experiment 2 and the full array of VIAscan® measurements was established and then a multiple regression model was developed to predict EUROP scores (GenStat 5.4.1, 2000) based on several of the correlated VIAscan® measures. Both HCW and GR were included as covariates.

RESULTS

Experiment 1

The carcasses covered the wide range in weight (12.4-32.2 kg) and GR tissue depth (4-25 mm) found in the industry providing the degree of variation needed for such a study. The distribution of EUROP scores for each assessor is shown in Figure 1.

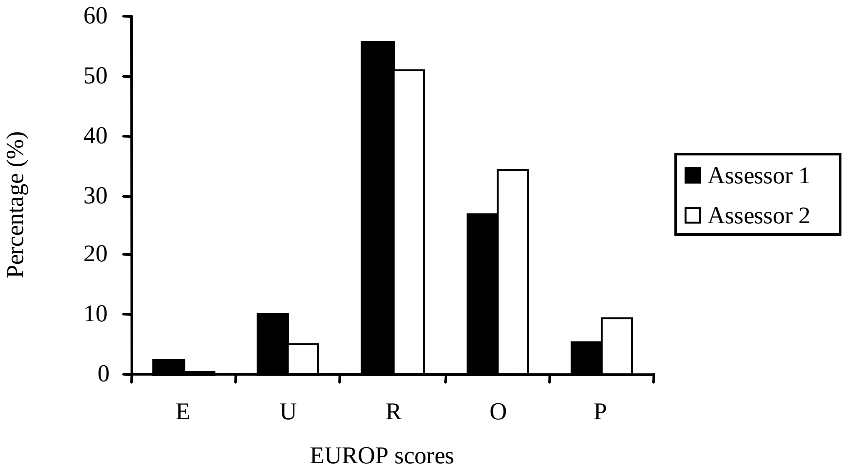

Figure 1. Distribution of EUROP scores according to assessor where E is 'best' and P is 'worst'.

Conformation scores were higher for assessor 2 than assessor 1, although there was a significant interaction between assessor and slaughter group ($P < 0.001$) as the difference was only significant for slaughter group 1 (Table 1). Scores for lambs at the second slaughter were lower ($P < 0.001$) than for the other two slaughters. Conformation scores decreased (improved) with increasing carcass weight (b= -0.033 ± 0.006 score/kg, $P < 0.001$) and fat level (b= -0.018 ± 0.006 score/mm GR, $P < 0.05$). The correlation between scores for the two assessors was r = 0.54.

Table 1. Predicted means for the significant assessor, slaughter day and assessor x slaughter day effects for EUROP scores adjusted to a hot carcass weight of 21.4 kg and a GR of 12.3 mm

Assessor	Slaughter day			Overall mean s.e.d. = 0.03
	1	2	3	
1	3.2a	3.2ac	3.3cd	3.2α
2	3.7b	3.3ac	3.5d	3.5β
Overall mean s.e.d. = 0.05	3.4α	3.3β	3.4α	

Combinations with the same superscript, differ by less than twice the standard error of the difference. Average s.e.d. across assessor × slaughter day combinations = 0.07.

Experiment 2

The coefficients for the regression model to predict EUROP scores using VIAscan® measurements are shown in Table 2. All regression terms were significant ($P < 0.001$), with VIAscan® measures 2 and 3 having the most influence on the model. VIA1 is based on colour of the carcass over the chump/rump area, whereas VIA2 and VIA3 are dimensional measures. EUROP scores decreased (improved) with increasing carcass weight (b=--0.045 ± 0.014, $P < 0.001$), but GR was not significant.

Table 2. Regression relationship between EUROP scores and VIA measures

	Regression coefficient
Intercept	11.3 (± 0.76)
Independent variables	
VIA1	-0.015 (± 0.003)
VIA2	0.017 (± 0.001)
VIA3	-0.043 (± 0.003)
R^2	0.58
r.s.d.	0.54

DISCUSSION

Several points emerge from the data. The first is that there was only a moderate relationship between the EUROP scores of the two assessors. As such for the first slaughter day this resulted in a significant mean difference in the scores given. Previously it has been reported (Hopkins 1995) that when industry personnel assessed carcasses for EUROP conformation the correlations against scores given by an independent assessor ranged from 0.32 to 0.75. Comparison of the results for the two assessors did however show that on two of the slaughter days there was no difference between the mean scores. Obviously differences between assessors can reflect degrees of experience, but also arise because individuals will vary in their interpretation of in this case the reference photographs.

Although conformation is used to describe carcasses in a number of countries Lebert (2000) it is conceded that the EUROP system has some imperfections as does any system that relies on subjective appraisal. These imperfections include assessors varying their scoring over time and differences between assessors and also between assessors and those who enforce the adherence to the standards (Lebert 2000). Despite the reliance on such systems there appears to be no published comparisons of the extent of differences between assessors when assessing the same carcasses for conformation.

That fatter and heavier carcasses were given better conformation scores (ie more E and U) has been widely reported before (see the review by Kempster *et al.* 1982). Such an outcome is consistent with the definition of conformation as used in the EUROP system where it is defined as “the thickness of flesh and subcutaneous fat relative to the dimensions of the skeleton” (De Boer *et al.* 1974). By contrast when conformation scores were predicted using VIAscan® measures GR (a measure of fatness) did not have any significant effect. This may reflect the fact the VIAscan® measure based on colour variation (VIA1) accounted for differences in subcutaneous fat levels.

The third aspect to note from this study is the potential, which exists to assign EUROP scores to carcasses using VIAscan®. Lebert (2000) in a review of several different VIA systems also showed that they could assign carcasses to different EUROP classes with a reasonable tolerance. Much of the emphasis on the use of VIA for describing lamb carcasses has been on prediction of meat yield (Hopkins *et al.* 1997a; Stanford *et al.* 1998), but the system has potential for the prediction of other characteristics such as fat levels and conformation scores. In the past VIAscan® has been used to predict objectively measured muscularity values (Hopkins 1996), but unfortunately the general validity of the model to other populations did not hold (Hopkins *et al.* 1997b). It could be argued that this same test of validity needs to be applied to any model to predict EUROP scores, but in this case our standard is a subjective scoring system making validation more difficult. A different approach would be to develop a set of standards and scores for carcass shape based on linear dimensions. With this approach VIAscan® could then automatically allocate carcasses to scores based on objective measures.

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Email: David.Hopkins@agric.nsw.gov.au