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SKIN QUALITY AND ABATTOIR PRACTICES

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APPENDICES

SKIN QUALITY AND ABATTOIR PRACTICES

(i) Background and industry context

1) This research is a sub-project of the AMLRDC Sheepskin Commissioned Research Program".

2) It was prompted by a report by John A. Carlisle, a skin merchant member of Sheepskin Export Packers Association of Australia (SEPAT), that tanners in Mazamet, France, are finding an increase in grain damage to Australian sheepskins which they attribute to mechanical pelting. This was followed up by a letter from Paul Azaïs et cie of Mazamet in which it was claimed that 20-30% of some skin shipments were downgraded to the extent of $A7.00 per pelt after fellmongering. As there is currently no system of identifying skins as to the meatworks or abattoir of origin, this reduction in value must be reflected in the average price paid for exported skins.

3) Currently some 88% of a total availability of some 33.0 million Australian sheepskins are exported in a preserved state, i.e. dried or salted. Of these some 65% (16.1 million) are fellmongered and 35% are tanned wool on. Coarse grain damage is not normally detected in a wool-on skin and only becomes apparent in the pickled pelt state after fellmongering. Fine grain damage may be detected in a pickled pelt but often is not, due to the speed at which the pelt graders work. The full extent of fine grain damage may only become apparent after completion of tanning, by which time significant "added value" has become "added cost".

Fine strain is not commercially significant in wool-on skins. Severe coarse strain shows as a "wrinkle" on the flesh side of tanned skins and will in some cases affect pricing.

4) The Australian meat industry is adopting mechanical pelting technology as a means of reducing the cost of slaughter through labour reduction. Many countries that are significant producers of sheepskins fellmonger them promptly after slaughter and are thus able to detect grain damage at this stage. By contrast Australian exported skins may be held in store overseas for six months or more prior to fellmongering. This delay in feedback, added to the lack of identification of the skins and price averaging, means that there is little or no feedback to individual works on defects related to processing equipment and procedures, and hence no opportunity or incentive to improve performance.

5) While this project was underway but subsequent to the completion of the works section of the survey (see (iii) Methodology, page 4), the COLOMER report "Grain Strain in Sheep Skins Produced During Flaying" became available to the research team. We found it invaluable in interpreting the survey pelt diagrams as to the probable causes of coarse and fine strain. Copies of this report (coloured version in Spanish and black and white English translation) have been distributed to a cross-section of organisations involved in the sheepskin industry. The COLOMER report has been quoted and used as a sheep-dressing information-transfer medium by the UK publication *LEATHER* and by New Zealand's *LASRA*, and is recommended reading for anyone associated with live-sheep handling, abattoirs, skin merchants, etc.

(ii) Objectives

1) To determine the feasibility of detecting grain damage in green skins at the abattoir

2) To ascertain the extent of grain damage caused to lamb pelts by various dressing systems

The survey was to examine one conventional manual dressing system (CMD) and three mechanical dressing systems (MDS), and be conducted in conjunction with the grain damage detection investigation.

3) To compare skin damage detected in green skins at the meatworks with that detected in pickled skins at the fellmongery in order to determine whether all commercially significant damage could be detected before the pickled pelt stage

A prototype skin damage detector (or "light box") was to be employed in these trials.

4) To determine whether further development of the prototype device was justified by observing the degree of correlation between grain damage detector results on green skins and pickled pelts.

(iii) Methodology

Survey of green skins versus pickled pelts

1) To ensure meaningful comparisons, the survey was to be conducted at meatworks which process the same stock types, i.e. crossbred lambs for the domestic market where the quality of the dressed carcass is of primary importance and the value of the skin type greatest. Four works were selected, of which three use different forms of mechanical pelting systems and one uses a conventional manual system.

2) One of the mechanical-system works closed down for alterations to enable it to obtain an export licence and its survey was postponed. Subsequently the owners decided for economic reasons to defer the reopening indefinitely. As there was at that time no suitable alternative works prepared to cooperate in the survey, a decision was made to limit the project to the three works where the surveys had been completed.

3) To ensure uniformity between works of the lambs in the survey, they were selected and spray branded prior to slaughter by Mr Ron Watterson of Brooklyn Hides and Skins. Mr Watterson has had a working lifetime's experience in the sheepskin side of the meat industry, including fellmongering.

4) The selected lambs were processed as a lot and all aspects of the slaughtering which could affect skin quality were examined. The paint-marked skins were collected for individual identification and for detailed examination of some 30 skins from each works in the green state. For each of the light-box-inspected skins, an individual chart was marked to indicate the location and comparative dimensions of all detected strain. All the skins in the lot were then drum salted using comparable salt weights per skin and standard additives. This was done to preserve the skins until the completion of the works' survey, so they could be fellmongered as one lot and thus preclude variations in de-wooling and pelt pickling.

5) On completion of fellmongering, the pickled pelts were graded by the fellmonger to their normal standard and then transported to the Leather Research Group's facility at Maribyrnong for assessment by them. Current values for pickled pelts were obtained from the fellmonger so the effects of skin damage on pelt value could be assessed.

6) The facility at Maribyrnong was set up as part of the AMLRDC Skin Spec Project CS088. It comprises a flat white table of sufficient area to accommodate any size sheepskin, with fluorescent lighting arranged so as to direct light onto the table, both perpendicular to the table surface and at angles. The light box which had been used at the works to inspect the green skins was used to inspect the skins previously examined with wool on at the works.

7) The following assessments were carried out:

a) Identification of coarse and fine strain on pelts which had been examined on the light box immediately after slaughter so an assessment could be made of the effectiveness of the light box in detecting strain damage.

b) Identification of coarse and fine strain on all the pelts received from the fellmonger to assess the loss in value due to strain only.

c) Determining the value of the light box in identification of non-strain inherent faults in the pelts, such as mottle, ribbiness, pinholing, etc.

(iv) Success in achieving objectives

1) Objectives 1, 3 and 4 were achieved.

2) Objective 2 was achieved to a limited extent. As only some of the coarse grain strain and none of the fine strain can currently be detected in green skins, it is necessary to fellmonger them before they can be assessed for these faults. However, from the location and orientation of the strain as observed in the pickled pelts, the likely causes can be judged with a fair degree of accuracy, i.e. whether it is due to poor wool-side handling techniques, incorrect direction of pull on the skin, gripping damage by the mechanical puller, or stress in "sock" pulling the hind legs, etc. The importance of the COLOMER report in establishing how to interpret the causes of strain cannot be over emphasised.

(v) Findings

1) Raw skins

The light box enables most of the coarse grain strain to be detected but the time taken per skin was inconsistent with what would be necessary for inspection of each skin at production rates. No fine grain strain was detected with the light box.

2) Pickled pelts

The light box was found to be useless for the detection of fine grain strain, but helpful for coarse strain, mottling and other pelt-quality characteristics. Fine grain strain shows up best under light striking the grain surface from the top at an angle.

3) All three works had both coarse and fine grain strain. The coarse strain was predominantly in peripheral areas of the pelts where it should not affect commercial value. The fine strain was mostly in the same areas as the coarse strain. In the CMD works and one of the MDS works, the fine strain tended to be in the same areas as the coarse strain, but encroached further into the area where it would affect commercial value. The other MDS works had comparatively little coarse strain and the fine strain tended to be much closer to the periphery than for the other two works.

4) General

The location and orientation of both coarse and fine strain is consistent with the findings of the COLOMER report, viz:

- gripping and pulling on the wool (grain) side of the skin during the flanking operations;
- pulling the flank skin parallel to the spine;
- skinning the hind legs sock fashion.

There are indications that the presence of coarse strain in non-commercially significant skin areas may be a pointer to associated fine grain strain extending further from the periphery where it can be commercially significant. This would not be the case for fine strain associated with sock pulling of the hind legs.

(vi) Conclusions

1) There is potential for reducing commercially significant grain strain by modifying dressing procedures for both conventional manual dressing and mechanical dressing systems.

As the modifications may for the most part involve additional labour, works may be reluctant to do this until they can be assured of an off-setting premium for better quality skins.

It will be difficult to achieve premiums for better quality skins unless:

- skins can be identified, from the time they leave the works until fully tanned, as to the works in which they were processed;

and/or

- a significant percentage of skins are fellmongered in Australia, as the true commercial value of the pelts cannot be determined until the pickled pelt stage at the earliest.

2) The light box can be a useful quality-assurance tool at works if utilised on sample skins (at, say, 1 in every 100) to detect coarse strain. It is too slow a method to be used on every skin and does not detect fine grain strain. We should continue to investigate more sophisticated means of detecting grain strain in wool on skins, e.g. infra red, ultra sound, video imaging, etc. The variety of related factors associated with wool-on raw skins (fat and meat adhesions, blood vessel haemorrhages, ribbiness, skin pigmentation, etc.), mitigate against a cost-effective solution being found.

3 System comparisons

On the limited basis of the survey and for the type of lambs involved (which are the most valuable of Australian production), there appears to be no basis for the contention by European skin merchants that mechanical pelting as carried out in Australia results in more grain strain than conventional manual dressing. The CMD works in our survey had the greatest amount of coarse grain strain, but this did not translate to a greater amount of commercially significant damage.

(vii) Progress in commercialisation

Not relevant to this project.

(viii) Total funding and AMLRDC contribution

Total funding for this project was:

Operating	$88,100
Capital	Nil
TOTAL	$88,100

This was contributed by the CSIRO's Institute of Animal Production and Processing through the Meat Research Laboratory and Leather Research Centre, and the AMLRDC in the following proportions:

AMLRDC	68%
CSIRO	32%

(ix) Impact on the meat and livestock industry - present and within five years

1) The publication and wide distribution of this report to producers and processors will demonstrate the potential for improving the value on sheepskins up to the time they leave the works or abattoir.

2) Some will institute changes to their operations to the extent that this does not increase the costs of production.

3) Until such time as skins can be identified from the time they leave the farm (preferably from weaning) until fully tanned, there can be no incentive for producers and processors to incur additional costs to improve skin values, as there is no mechanism by which they can be rewarded for their efforts. An exception to this could be a processor who is vertically integrated to the extent that he sells direct to an overseas fellmonger who will pay a premium for demonstrated superior quality.

4) In the absence of a reliable and practical method of identifying damage in green skins, the re-establishment of fellmongeries in Australia, to the extent they can be financially justified, is the best way to encourage improvement in skin quality.

5) A significant number of Australian skins are currently fellmongered for their wool value alone, the pelt being considered worthless. The decision is based on the length and quality of the wool compared to the cost of fellmongering. To the extent that pelt quality can be improved, skins now considered marginal may be worthwhile fellmongering, as the cost could be spread over the wool and pelt.

6) Recent anecdotal information that overseas fellmongeries are coming under increasing environmental cost pressures, together with the importance of new entries in the world leather industry, e.g. Turkey, Korea, Japan, may foreshadow a window of opportunity for the establishment of fellmongeries in Australia.

(x) Recommendations

Processing investigations

1) The work carried out under CS 138 has demonstrated that mechanical dressing (MDS) does not, of itself, result in greater damage to sheepskins than conventional manual dressing (CMD).

2) Depending on the type of MDS utilised, there can be more or less strain damage than with CMD, but more significant butcher damage to CMD skins during manual dressing operations can lower the commercial value of the skins to a greater extent than strain damage.

3) The survey established that all the surveyed systems are producing commercially significant damage and that modified dressing techniques, which may, however, require additional manning, could improve this situation.

4) The following methodology is proposed:

a) Carry out video surveys of sheep dressing at works utilising different MDS, including the AMECO system at Mudgee, with a CMD works as a control, identify the skins, fellmonger, evaluate the damage.

b) Institute modified dressing techniques, identify the skins, fellmonger, evaluate the damage.

c) Compare the results to identify any additional processing costs and the improvement in skin values.

Skin identification

1) In New Zealand, MIRINZ and LASRA, in conjunction with a commercial collaborator, have produced a tagging system which they believe satisfies their requirements for identifying skins from slaughter to receipt by the tanner of pickled pelts.

2) The system should be equally suitable for Australia, but is unlikely to be adopted by industry until a skin-pricing system, based on quality measured against a national specification, is in place.

3) Except for skins which are tanned wool on, New Zealand skins are fellmongered within a day of slaughter and are very seldom salted or dried. To avoid a situation where the New Zealand system is found at a later date to have deficiencies under Australian conditions, we recommend that it be trialled in conjunction with the work listed in paragraph 4 above (Processing Investigations). The viability of the method in identifying skins through drying or salting, packing and shipping, as wool-on skins, can thus be determined. If deficiencies are found, modifications may overcome them. Failing this, there will be time to develop an alternative system.

4) Any identification system should be a national one administered by, say, AUS-MEAT.

Skin damage detection

1) The light box has proved to be unsatisfactory for the detection of fine grain strain in green skins.

2) An alternative quality-assurance strategy could be to routinely fellmonger sample skins at works. We recommend that the Leather Research Centre develop a rapid depilation process to enable works to detect grain damage on a day-to-day basis, so immediate corrective action can be taken whenever dressing performance falls below the lower control limit.

3) We believe two approaches should be investigated:

a) Application of a high-strength lime sulphide depilatory to the areas of sample skins susceptible to grain damage (mainly the flanks, and in the case of a MDS system, the gripping point of the final puller) on one side of the skin only. The wool would be pulled from these areas and the grain strain assessed and recorded. The area of skin which had the depilatory applied would be cut away and the remaining skin sold as a piece. This procedure would not require de-liming, and pickling which is carried out subsequent to wool pulling.

b) Application of the depilatory to the complete skin, wool pulling, de-liming and pickling which would produce a normal pickled pelt. The grain strain and other dressing faults would be assessed and recorded.

4) The two methods would be evaluated as to the capital cost of the test facilities, the labour and materials costs and the residual value of the part skins or pickled pelts, and the value to management of the information provided.

APPENDIX I

INVESTIGATIONS INTO STRAIN DAMAGE ON AUSTRALIAN SHEEPSKINS

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INTRODUCTION

Grain damage to sheepskins in the form of cracks in the grain layer can occur if skins are excessively stressed during flaying. This type of damage to pelts has been reported by sheepskin tanners for many years. For the purposes of this report, grain damage caused by excessive stress during flaying shall be referred to as STRAIN DAMAGE to avoid confusion with other types of grain damage. It is referred to in this report as 'coarse strain' or 'fine strain', depending on its severity.

Recent reports indicate that the incidence and extent of this damage has become serious not only on Australian skins but world wide, and it has been implied that the introduction and use of mechanical skin pullers is responsible.

The investigations recorded in this report are in response to these claims, and are a preliminary attempt to quantify the level of damage occurring due to strain. Presently, no accurate information on the extent of this damage is available.

The approach adopted for this study was to take shorn lambskins from three abattoirs using different take-off procedures and/or equipment. Two of the abattoirs used different types of mechanical pullers, whilst the third used manual flaying procedures. The type and extent of grain damage on the skins from each of the three abattoirs was recorded and comparisons made of the damage resulting from the different pelting procedures.

In a detailed study into grain damage caused by strain, the report from the Spanish Colomer tanning group (1) concluded that sheepskins were most easily damaged in the flanks by traction forces applied parallel to the backbone. The report recommended that skins should be fully opened up to remove lines of tension in the flanks. The most severe and most easily caused grain damage was induced by tugging of the wool during flaying.

MATERIALS AND METHODS

To quantify the severity and extent of strain damage, skins from approximately 120 shorn lambs of similar dressed weight (16-18 kg), were collected from each of three selected abattoirs. Works 1 has a manual dressing system whilst Works 2 and 3 employ mechanical dressing aids and skin pullers.

The freshly flayed skins were numbered in the rear kells (also referred to as pockets or auxilla) for later identification. The skins collected from all works had wool lengths of 35-55 mm.

Approximately one third of the green skins from each works was inspected for grain damage by placing the skins over a light source. This was done to investigate the possibility of developing a quick assessment technique of strain on freshly pulled skins. Skin numbers and the position of strain damage were recorded on diagrams of pelts.

Following the light source inspection and numbering, the skins were preserved by drum salting. The skins from Works 1 were processed on site whilst the skins from Works 2 and 3 were commercially drum salted by a skin merchant. In all cases, the skins were salted with D.F. Hide Salt (ex Cheetham Salts) containing boric acid and sodium fluoride.

The salted skins were sent to a fellmonger for processing by their standard sulphide depilation method and the wool was recovered by a mechanical wool puller. Skins were inspected at random after the mechanical wool puller for possible damage caused by this machine.

The dewooled pelts were then limed and pickled by a standard process and the pickled pelts were graded by the fellmongerer into standard grades (1-6). This assessment included strain damage. Other faults such as cuts, seed damage, pinhole, mottle, ribbiness, size and symmetry were also considered in these gradings.

The pelts were returned to the Division of Wool Technology where strain damage to individual skins was recorded on individual diagrams of a pelt. The pelts were re-graded to assess the commercial significance of the strain damage. This grading was performed by CSIRO staff, based on a procedure used by Brooklyn Hides and Skins. In borderline cases, the skins were classified into lower grades. Consequently, it could be expected that there would be slightly less top grades in the CSIRO assessment compared to a commercial assessment.

RESULTS AND DISCUSSION

STRAIN DETECTION WITH A LIGHT SOURCE

a) Raw Skins

The incidence of strain detected with the light source is recorded in Tables 1, 2 and 3 and compared to the pickled pelt assessment. The strain damage is described as coarse or fine, and compares to types "a" and "b" respectively in the Spanish Colomer workers' study (1).

Open breaks in the grain were detectable where the break was wide enough and the skin thickness was sufficiently reduced to transmit light through the skin more intensely than the normal skin thickness. When skins were viewed with the light source under the skin (flesh side) it was almost impossible to see any strain damage. However, when viewed with the light source under the wool, coarse strain marks were visible around the edge of skins, although sometimes only with careful inspection. In general, the detection of broken grain was made more difficult with increasing wool length, density and soil content.

b) Pickled Pelts

Pickled pelts viewed with the light source clearly show coarse strain marks. However, contrary to expectation, fine strain marks which were clearly seen with good overhead lighting were obscured when viewed over the light source due mainly to the natural grain pattern as well as skin mottle and blemishes on the flesh side.

Probable fine strain damage was detected in 2 of the 116 skins assessed over the light source. When assessed as pickled pelts, under normal lighting conditions, fine strain damage was detected in 80% of these same skins.

More than 60% of pelts from each works had both types of strain damage. The figures also reveal that not all the coarse strain in the raw skins was detected with the light source on the raw skins.The individual record of the types of strain damage in Tables 1, 2 and 3 merely indicates the presence or absence of the strain damage and does not reflect the extent and severity of the damage or the commercial grading significance.

PICKLED PELT STRAIN DAMAGE - TOTAL ASSESSMENT

Strain damage was recorded for individual pelts. The results are summarised in Tables 4, 5 and 6. A comparison of the data obtained from Works 1, 2 and 3 is shown graphically in Figures 1 and 2.

a) Full Skin Assessment

(1) Coarse strain damage

The incidence of coarse strain damage detected at all three works was greater than 66%. However, Works 1 (manual pelting) was some 26% higher than the works with mechanical pullers.

Generally, whilst the coarse strain appears severe, it is confined to the peripheral belly regions and rarely extends further than 5cm in from the edge.

The Colomer study (1) concluded that coarse strain was primarily caused by wool handling. The strain damage observed on skins from the three works in this investigation is consistent with rough handling of the woo side of the skin during skin take-off.

(2) Fine strain damage

Fine strain damage due to flaying was recorded in more than 80% of skins from all works, with the largest variation being only 10% between any works. Again Works 1 with manual take-off recorded the highest incidence of damage.

The very high incidence of fine strain damage recorded in the bellies and flanks indicates that the three works induce too much strain on their pelts. The most notable observation was that less than 10% of skins from any of the works was free of strain damage.

b) Side Assessment

The types of strain present, recorded for either full skins or sides, have been divided into fine (only); coarse (only); or both (fine plus coarse) types. The numbers for each category in the side assessment vary considerably from those recorded against the assessment for full skins.

Except for Works 3 (which has the greatest variation in coarse strain between left and right sides), there is generally little difference in the total number of sides affected by strain within any one works. There is, however, variation between abattoirs, with Works 1 (manual pelting) recording the highest strain figures for both fine and coarse types and the lowest number of strain-free sides.

There is little difference in the total number of strain-affected sides within any one works (excluding coarse strain - Works 3), suggesting that both sides have similar lines of tension in the flanks during take-off.

The possible exception to this is sides from Works 3 which exhibit more left sides being roughly handled by the wool.

The variations between works may reflect the type of pulling mechanism, differences in the degree of work-up prior to pulling, or combinations of both factors.

c) Pickled Pelt Strain Damage - Commercial Assessment

The effect of strain on commercial grades (as assessed by CSIRO staff) is set out in Tables 7 and 8. These gradings are summarised in Table 10 and Figures 3 and 4, and are compared to the gradings derived from taking all skin faults into account.

It is clear from this comparison that the extent of strain damage from all works had little influence on commercial grading which takes all faults into account.

While Figure 4 highlights that Works 3 (mechanical puller) had the least damage, and Works 2 by far the most commercially significant damage, this investigation demonstrates that manual skin removal is not the whole answer to reducing strain damage.

Grading skins for strain highlighted that in general the coarse strain was not commercially significant. Most skins were downgraded due to fine strain in the flanks where the damage appeared in the prime cutting area of the pelts. The pelts from Works 2 were most affected in the flanks inside the cutting area with approximately 30% being downgraded to third grade.

THE EFFECT OF STRAIN DAMAGE ON PELT VALUE

Pickled pelt prices were obtained from two Australian pickled pelt suppliers. The effect of strain damage on pelt value is compared in Table 8, and is based on the pelt grades set out in Table 7.

There is significant loss of value to pelts from Works 1 and 2. Whilst value lost to Works 3 could be considered marginal, any loss of revenue to companies should be unacceptable. Losses significantly downgrade the potential value of pelts and harm Australia's reputation as a consistent supplier of raw material.

It is likely to be difficult to make a strong case for meatworks to improve their take-off if skins are downgraded due to other faults. Furthermore, as most skins are downgraded due to fine strain, skins going to the woolskin processing trade would, presumably, not suffer from loss of value.

FELLMONGERING

After the wool on the skins was deemed loose enough for pulling, the skins were put through a mechanical wool puller to recover the wool from the pelts. Random inspection of skins following the wool pulling did not reveal any signs of strain induced by the wool puller.

However, epithelial residue and some wool remaining on the pelts may have obscured some induced fine strain.

WORK-UP PROCEDURES

Although there are some differences in work-up technique between the three works, the most notable difference is seen in the level of opening up of the skins prior to pulling. At Works 1 and 3, the skin on all legs was opened up whilst at Works 2 the hind legs were left unopened as socks. This may explain the increase in the extent of strain in these skins leading to their subsequent downgrading in the commercial assessment.

CONCLUSIONS

1. Mechanical skin pullers are not necessarily responsible for strain damage. The results from Works 3 clearly demonstrate that mechanical skin pullers can be used without causing commercially significant strain damage. The work-up procedures and skin preparation for pulling, either by hand or machine, need further investigation. However, differences in the extent of strain damage may exist between pulling systems under the same work-up procedures.

2. All works show a greater than 65% incidence of coarse strain damage. If the Colomer findings apply (1), it would appear that the wool side of the skins is being handled far too roughly at all three works, causing coarse strain damage around the belly and flank edges.

3. All works show approximately 90% incidence of fine strain damage. Again, based on the Colomer conclusions, it would appear that all the works are inducing too much strain in the belly and flank regions. As works 2 recorded the most commercially significant levels of this strain damage, it appears that their work-up procedure may be the least satisfactory.

4. Analysis of the strain damage on a side basis reveals a remarkably even distribution of strain types between left and right sides as well as between works. This would indicate, according to the Colomer assessment, that the strain in both flanks during take-off is fairly evenly distributed, and there was insufficient opening up of flanks and legs prior to the final pull and/or the skin is incorrectly held or clamped during the final pull.

5. Fine strain damage was not detectable using transmitted light in either green skins after take-off or on pickled pelts. Fine strain on pickled pelts is obscured due to natural grain patterns. It would be reasonable to assume that this is the same on green skins. Increasing wool length, pile density and dirt content decrease the transmission of light and makes even the detection of coarse strain very difficult. For this reason, it is unlikely that this technique will be a useful quality-control measure.

RECOMMENDATIONS

1. Investigate differences in procedures and levels of opening up required to eliminate strain damage.

The results indicate that substantial levels of strain damage can occur from manual take-off. As there are different mechanical pelting systems in use, these investigations would have to be undertaken on an individual abattoir basis.

2. Approach manufacturers and/or marketers of mechanical skin pullers for the establishment of necessary operational procedures to produce strain-free skins.

3. Compare one or more mechanical skin pullers with manual skin removal to evaluate variations due to:

(a) breed;

(b) age;

(c) weight ranges - particularly lambs;

(d) seasonal effects;

(e) daily flay performance;

(f) geographic location.

4. The introduction of a skin identification method such as the New Zealand system which is based on a bar coded tab able to withstand tannery and/or fellmongery procedures, could be used to give abattoirs feedback on take-off damage. The information feedback in Australia could be rapid where green sheepskins are fellmongered, but very slow with exported skins and Australia exports approximately 90% of annual production as skins.

REFERENCES

1. Enrique Gratacós, Ramón Costa, Jordi Sans & Manuel Portavella May 1989, "Grain strain in sheepskins produced during flaying", VIC (Barcelona).

Table 1: Comparison of Strain Damage in Lamb Skins
Works 1

Skin No.	Light Source				Pickled Pelts			
	Fine strain	Coarse strain	Both types	No strain	Fine strain	Coarse strain	Both types	No strain
1		*					*	
2				*			*	
3		*					*	
4		*					*	
5		*				*		
6		*					*	
7		*					*	
8		*					*	
9 not checked due to blood staining								
10		*					*	
11		*					*	
12		*					*	
13		*					*	
14				*			*	
15		*					*	
16		*					*	
17		*					*	
18				*	*			
19		*					*	
20		*					*	
21		*					*	
22		*					*	
23		*					*	
24		*					*	
25		*				*		
26				*			*	
27		*					*	
28		*					*	
29		*					*	
30				*			*	
31		*					*	
32		*					*	
33		*					*	
34		*					*	
35		*					*	
36		*					*	
	0	30	0	5	1	2	32	0

Table 2: Comparison of Strain Damage in Lamb Skins
Works 2

Skin No.	Light Source				Pickled Pelt			
	Fine strain	Coarse strain	Both types	No strain	Fine strain	Coarse strain	Both types	No strain
200				*			*	
201				*			*	
202	*				*			
203		*					*	
204		*					*	
205		*					*	
206				*	*			
207				*	*			
208				*			*	
209				*	*			
210		*					*	
211		*					*	
212				*	*			
213				*				*
214		*					*	
215		*					*	
216				*			*	
217		*					*	
218		*					*	
219				*			*	
220				*				*
221				*			*	
222				*			*	
223				*	*			
224				*	*			
225				*	*			
226		*					*	
227				*			*	
228				*	*			
229		*					*	
230				*			*	
231		*					*	
232		*					*	
233		*					*	
234		*					*	
235				*			*	
236		*					*	
237				*	*			
238				*	*			
239		*					*	
	1	17	0	22	11	0	27	2

Table 3: Comparison of Strain Damage in Lamb Skins
Works 3

Skin No.	Light Source				Pickled Pelts			
	Fine strain	Coarse strain	Both types	No strain	Fine strain	Coarse strain	Both types	No strain
400				*			*	
401		*					*	
402				*			*	
403				*				*
404		*					*	
405		*					*	
406				*			*	
407		*					*	
408		*						*
409				*	*			
410		*					*	
411		*					*	
412				*	*			
413		*					*	
414	*				*			
415		*					*	
416				*			*	
417				*				*
418				*			*	
419				*	*			
420		*					*	
421				*	*			
422				*			*	
423				*	*			
424		*					*	
425				*			*	
426				*			*	
427		*					*	
428				*	*			
429		*					*	
430				*			*	
431		*					*	
432		*					*	
433				*				*
434				*				*
435				*				*
436				*			*	
437		*						*
438				*	*			
439		*					*	
	1	17	0	22	8	0	25	7

Table 4: Pickled Pelt Strain Damage Total Assessment

Works 1

(a) Full skin assessment. (Skin numbers 1-117)

Fellmongery (Pelt Assessment All Faults)		Leather Research Group (Pelt Assessment Strain Only)			
Pelt Grade	Total Skins	Fine Only	Coarse Only	Both Types	No Strain
1	9 (8%0	-	-	9	-
2	5 (4%)	-	-	5	-
3	20 (17%)	1	1	18	-
4	15 (13%)	-	1	13	1
5	64 (56%)	7	2	55	-
6	3 (2%)	-	1	2	-
Total	116	8	5	102	1
%-age	100	7	4	88	1

*Skin 108 missing

(b) Side assessment--from diagrams on charts, as viewed

Fellmongery (Pelt Assessment All Faults)			Leather Research Group (Strain Only Assessment)							
Pelt Grade	Total Sides		Fine Only		Coarse Only		Both Types		No Strain	
	L	R	L	R	L	R	L	R	L	R
1	9	9	-	2	-	-	9	6	-	1
2	5	5	1	-	1	-	4	4	-	-
3	20	20	3	3	1	1	15	16	-	1
4	15	15	2	1	2	1	10	12	1	1
5	64	64	14	13	3	5	44	43	3	3
6	3	3	1	-	1	1	-	2	**	-
Total	116	116	21	19	7	9	82	83	6	5
%-age	100	100	18	16	6	8	71	72	5	4

**Side missing due to fleshing machine damage.

Table 5: Pickled Pelt Strain Damage
Total Assessment

Works 2

(a) Full skin assessment. (Skin numbers 200-316)

Fellmongery (Pelt Assessment All Faults)		Leather Research Group (Pelt Assessment Strain Only)			
Pelt Grade	Total Skins	Fine Only	Coarse Only	Both Types	No Strain
1	23 (20%)	9	--	12	2
2	12 (10%)	4	--	8	--
3	34 (29%)	9	--	22	3
4	15 (13%)	4	--	8	3
5	31 (27%)	6	--	24	1
6	1 (1%)	1	--	--	--
Total	116	33	0	74	9
%-age	100	28	0	66	6

*Skin 316 missing

(b) Side assessment--from diagrams on charts, as viewed

Fellmongery (Pelt Assessment All Faults)			Leather Research Group (Strain Only Assessment)							
Pelt Grade	Total Sides		Fine Only		Coarse Only		Both Types		No Strain	
	L	R	L	R	L	R	L	R	L	R
1	23	23	12	10	-	-	5	8	6	5
2	12	12	5	6	-	-	6	6	1	-
3	34	34	15	11	-	2	14	16	5	5
4	15	15	5	4	1	-	4	7	5	4
5	31	31	11	11	1	-	15	17	4	3*
6	1	1	1	-	-	-	-	-	-	1*
Total	116	116	49	42	2	2	44	54	21	18
%-age	100	100	42	36	2	2	38	47	18	15

*Parts of RHS of a skin missing due to processing damage

Table 6: Pickled Pelt Strain Damage
Total Assessment

Works 3

(a) Full skin assessment. (Skin numbers 1-117)

Fellmongery (Pelt Assessment All Faults)		Leather Research Group (Pelt Assessment Strain Only)			
Pelt Grade	Total Skins	Fine Only	Coarse Only	Both Types	No Strain
1	8 (7%)	1	--	5	2
2	8 (7%)	1	--	6	1
3	22 (18%)	7	1	14	--
4	13 (11%)	2	1	10	--
5	63 (52%)	18	6	33	6
6	6 (6%)	--	1	4	1
Total	120	29	9	72	10
%-age	100	24	7	60	9

(b) Side assessment--from diagrams on charts, as viewed

Fellmongery (Pelt Assessment All Faults)			Leather Research Group (Strain Only Assessment)							
Pelt Grade	Total Sides		Fine Only		Coarse Only		Both Types		No Strain	
	L	R	L	R	L	R	L	R	L	R
1	8	8	1	4	1	-	4	2	2	2
2	8	8	1	2	-	-	6	2	1	4
3	22	22	7	12	4	2	10	5	1	3
4	13	13	2	7	1	1	10	3	-	2
5	63	63	23	30	6	6	25	17	9	10
6	6	6	1	-	1	-	3	4	1	2
Total	120	120	35	55	13	9	58	33	14	23
%-age	100	100	29	46	11	7	48	27	12	20

Table 7: Pickled Pelt Assessment - Graded for Strain Damage Only

Works	Gradings					Total Skins
	1	2	3	4	5	
Works 1	65 (56%0	45 (39%)	5 (4%)	1 (1%)	-	116
Works 2	34 (29%)	43 (37%)	33 (28%)	4 (4%)	2 (2%)	116
Works 3	108 (90%)	12 (10%)	-	-	-	120

Table 8: The Effect of Strain Damage on Pelt Value

Works	Maximum Value	Graded Value	Value Lost	
	$	$	$	%
1	725	677	48	(6.6%)
2	725	617	108	(14.9%)
3	750	740	10	(1.3%)

The values were calculated on August 1990 pickled pelt prices, and were supplied by the fellmonger associated with trial. All prices are approximate and quoted as $A per dozen pickled pelts.

Pelt Grade	Fellmonger
	$A/Dozen
First	75
Second	65
Third	55
Fourth	45
Fifth	35

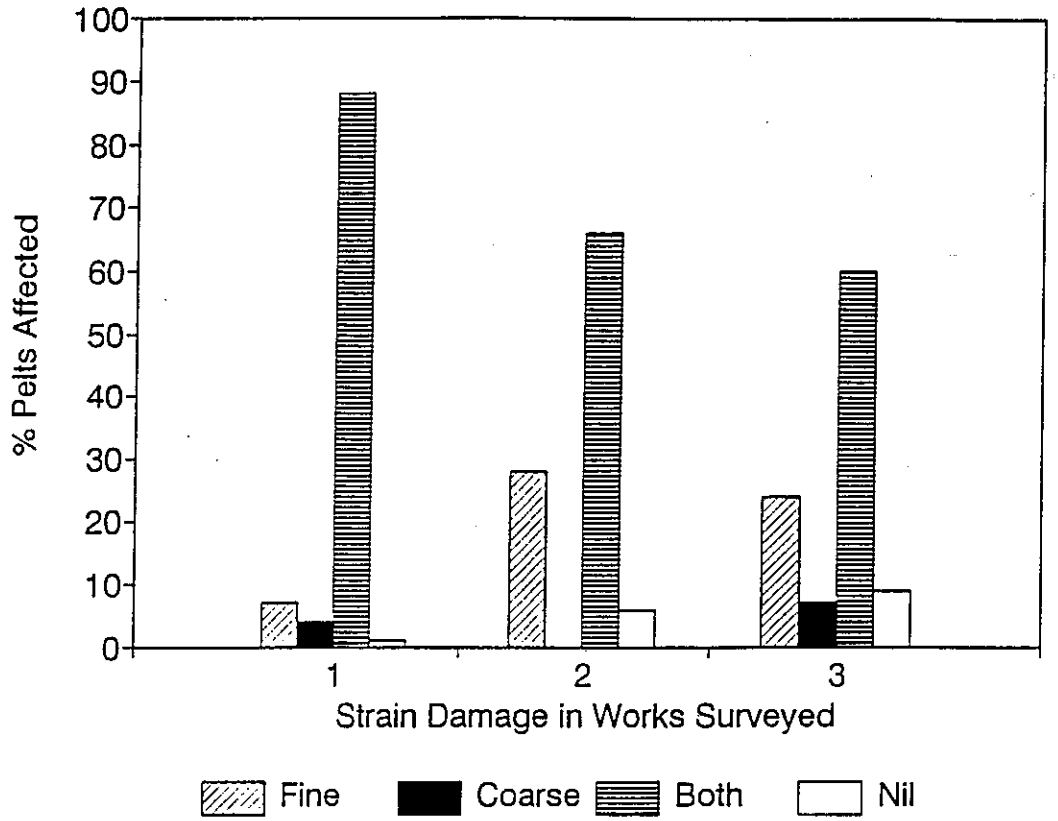


Figure 1 Total Strain Comparison - Full Skin

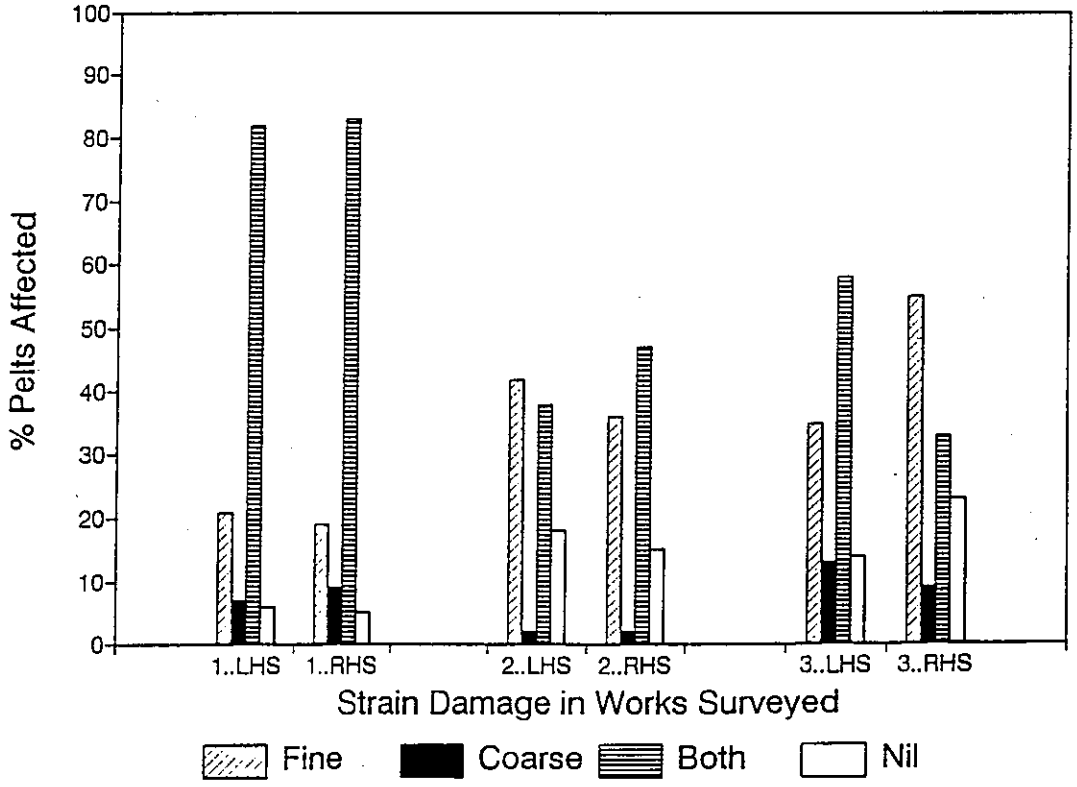


Figure 2 Total Strain Comparison - Side

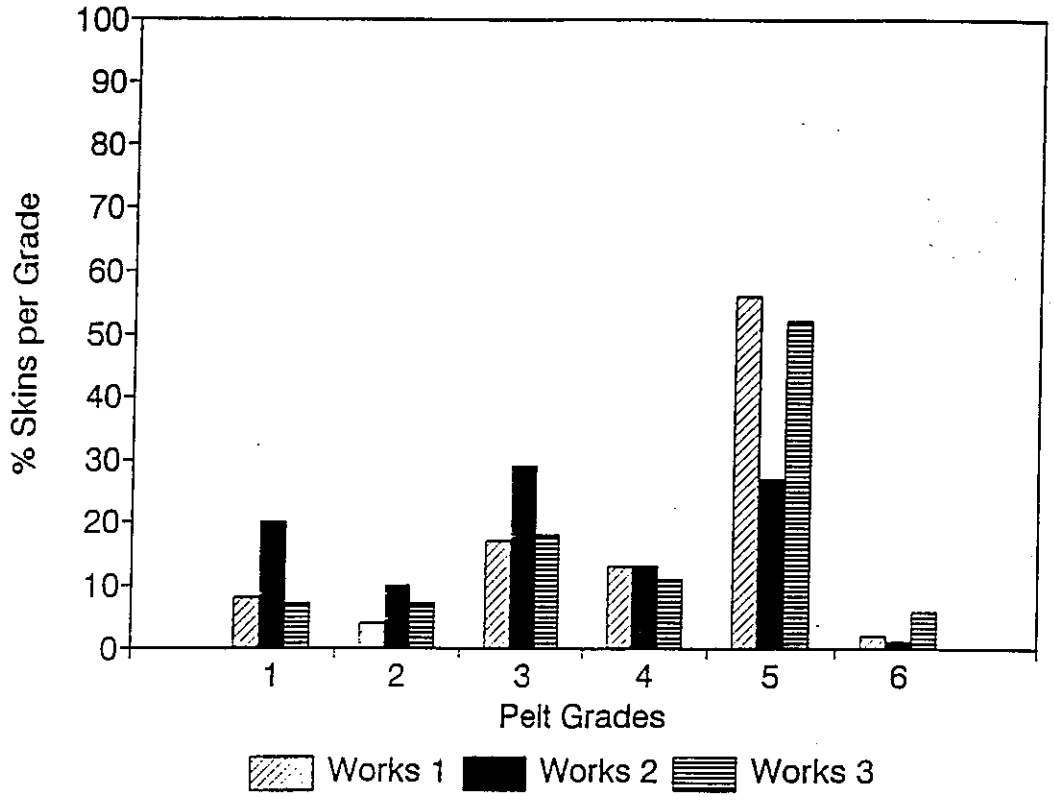


Figure 3 Pickled Pelts - All Faults Assessed

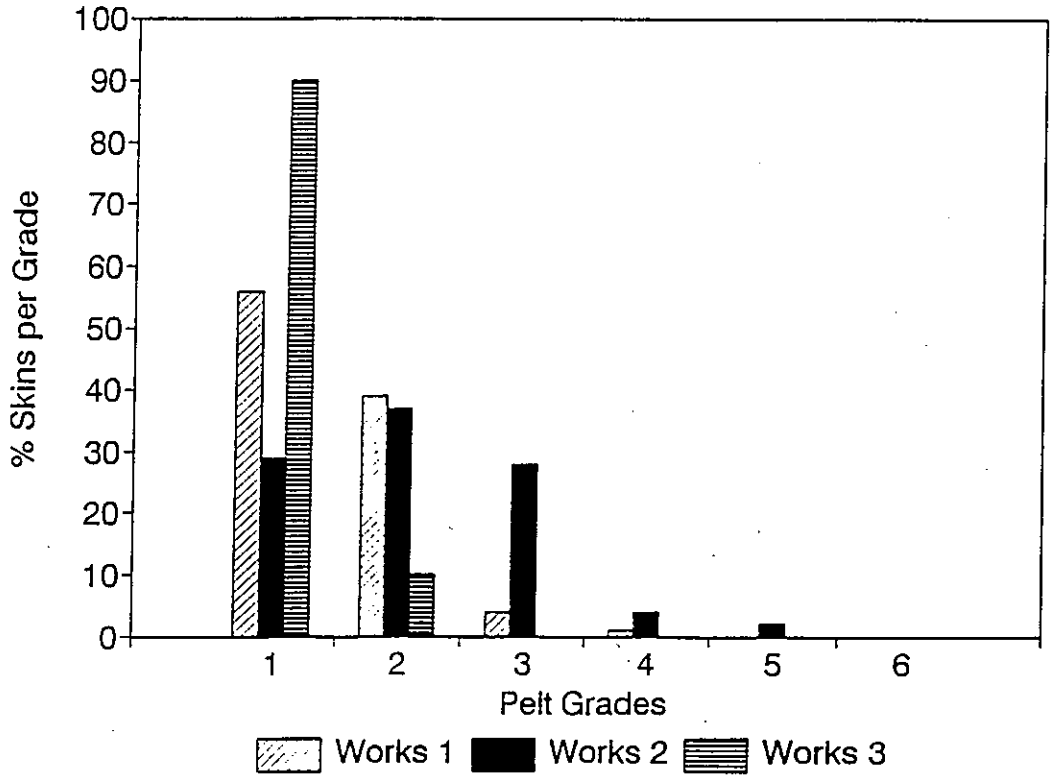
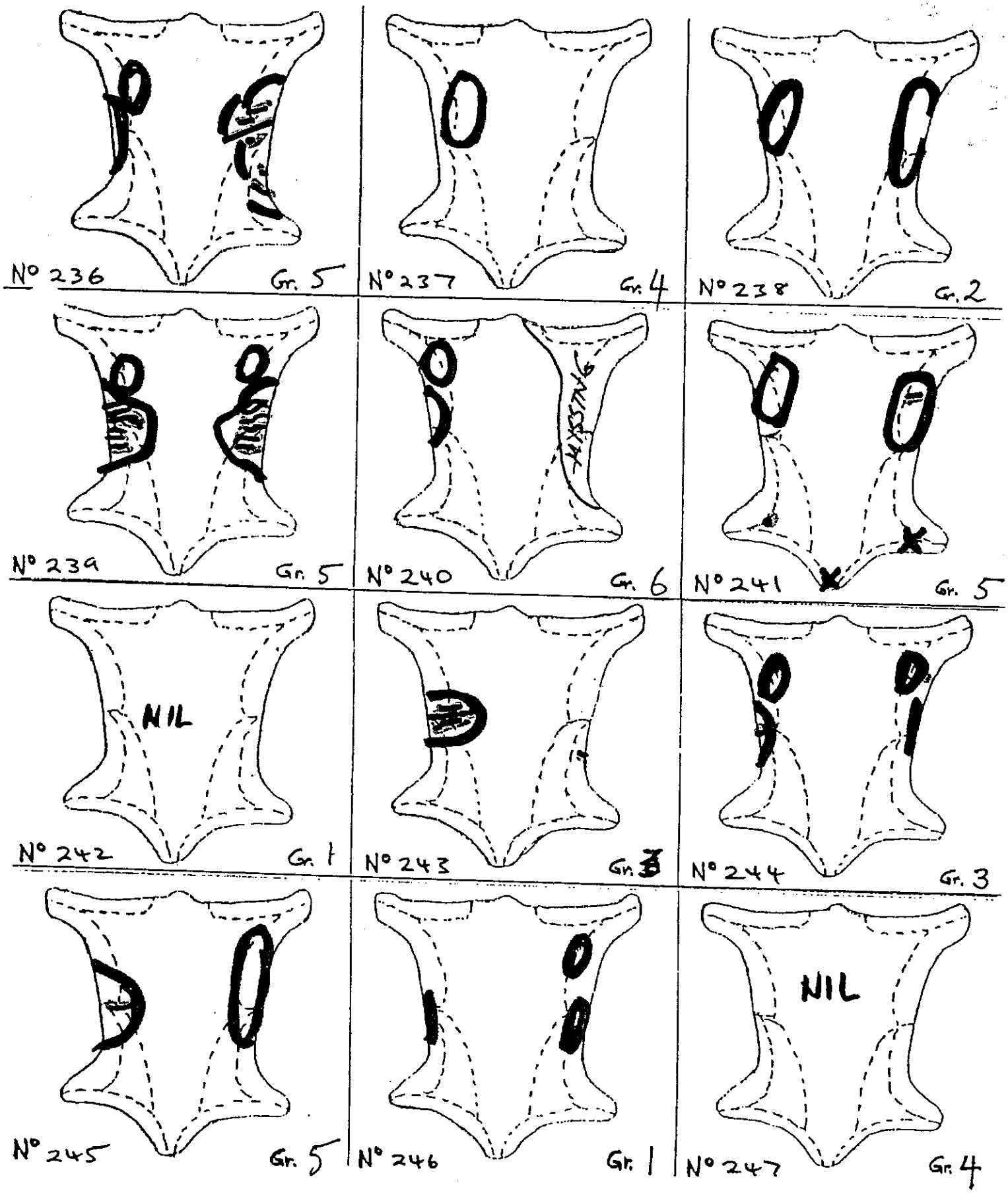
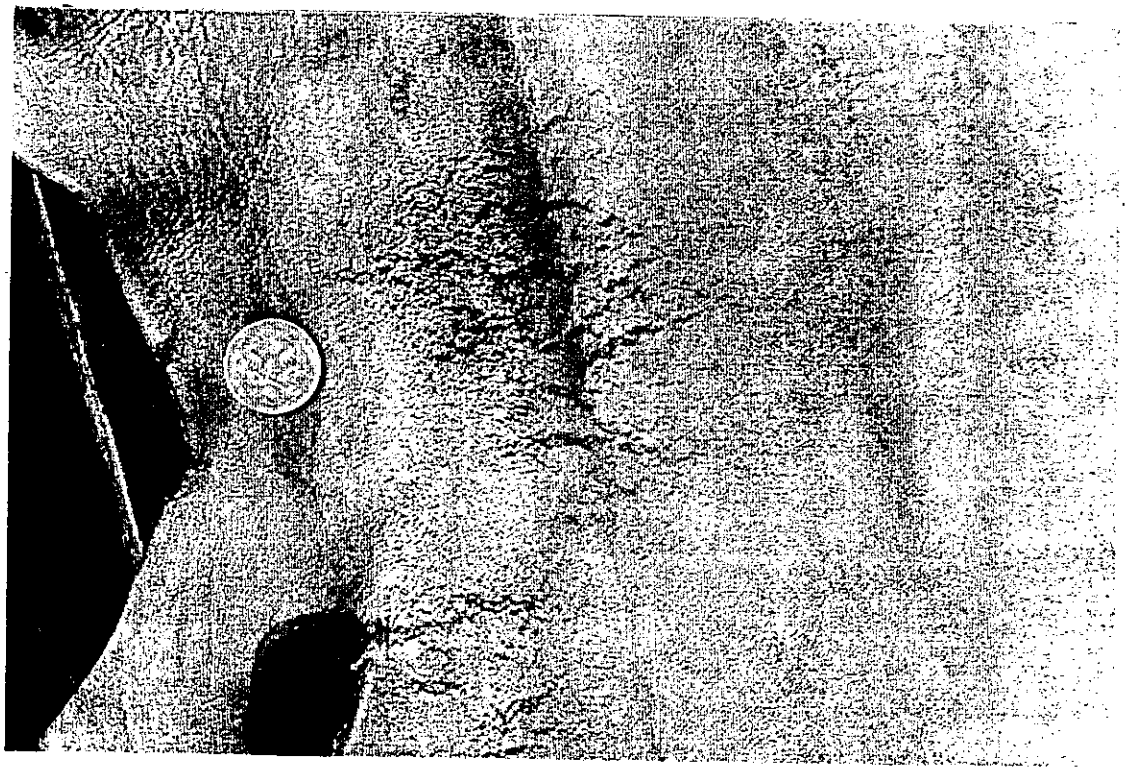


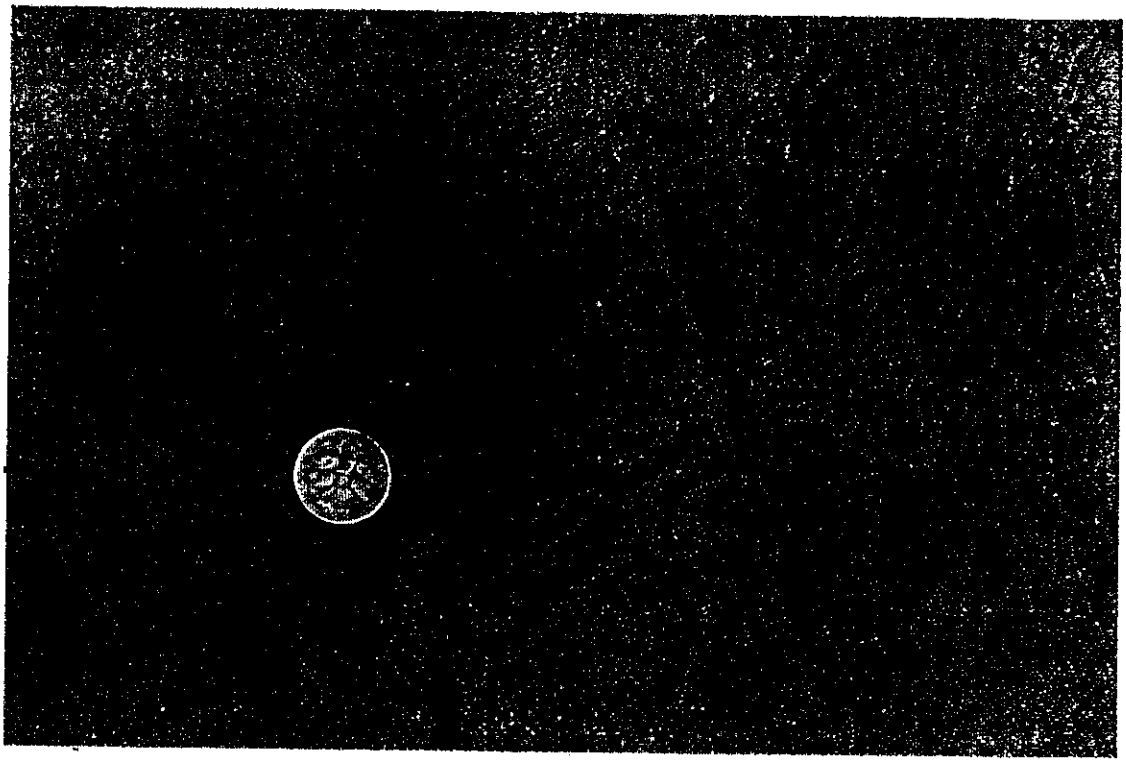
Figure 4 Pickled Pelts - Strain Only Assessed

APPENDIX II Pickled Pelt Assessment - No 236-247



APPENDIX III





Coarse and fine strain in relation to 5 cent coin