Improved Quality of Australian Crocodile Skins (C. porosus)
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Introduction

The skin of the Australian Saltwater Crocodile (Crocodylus porosus) is recognised as producing a unique leather of potentially excellent quality and value. Although C. porosus has been farmed in Australia for approximately 20 years, research and development has focussed mainly on capture, breeding and growth of the animals, and production costs, rather than on the quality and handling of the skins. The objective of this project is to identify faults that affect the skin and leather quality.

Improving Skin Quality

The value of a skin for leather depends upon the size and, critically, upon the usable blemish-free area. Crocodile leather goods are made from panels of leather cut from the skin after tannage and finishing. The presence of even a small blemish in a critical area can make it impossible to use a skin for a high value product such as a handbag, and instead relegates it to use for lower value items such as pens and purses. To maximise the quality of skins care should be taken during life, slaughtering and preservation. Figure 1 illustrates some skin faults.

Prior to slaughtering

It is essential that skin quality be maximised on the live animal. “Farmer Faults” such as infections, cuts, scars, abrasions, size, condition etc. should be actively addressed in time to allow improvement prior to culling. Quality can be reasonably accurately evaluated on live animals and cost / benefit decisions made on whether a skin is of premium quality or can reach premium quality either economically or at all. It may well be more economic to produce 100 first rather than 200 second grade skins.

Slaughtering

A skin will either maintain the quality it had at slaughter or it will deteriorate but it will not improve. Damage caused at or after slaughter can turn a 1st grade skin into a reject.

Skins should be taken off with great care to avoid knife scores as these will develop into holes during processing and are treated as seriously as actual holes and nicks. Poor placing of cuts results in irregularity of skin shape and loss of usable area.

Preservation

As soon as the animal is slaughtered, natural protection ceases and autolytic deterioration and microbial attack progress. Preservation can start before removal of the skin from the carcase with an antiseptic scrub and effective chilling. Thereafter,
preservation must continue uninterrupted until the skin is processed into leather. Failed preservation may be indicated by scale slip, discolouration or smell and may result in grain damage and loss of strength in the finished leather. Salt alone is not sufficient to protect skins for an extended period of time from bacteria and fungi. Salt additives should be used.

FIGURE 1 - Common faults in crocodile skin production.
Fault Identification

The blemishes on crocodile skins, particularly in the valuable main panel area of the belly, from collar to cloaca and flank to flank, are readily visible both in the live animal and post mortem. The various marks are used to estimate the value of the skin as finished leather and a grade given accordingly. For the live assessment, the option exists to slaughter the animal or retain it in order to allow blemishes to heal and fade, perhaps with intervention, depending upon the expected costs, risks and returns. Post mortem assessment allows the producer to identify causes of damage and hence loss and to make changes to the husbandry and early stage processing practices.

In order to make changes that are cost-effective and successful, the producer must be in a position to accurately identify blemishes and predict their impact on the finished leather value. However, because of the subjective nature of the assessments, the lack of a permanent record and the very limited body of information relating raw skin appearance to finished leather quality, both identification and estimation of the significance of blemishes has been highly variable. Therefore, the objective was made to capture a pictorial record of a batch of skins in the raw state, in the partially tanned state (‘wet blue’) and as finished leather and prepare a reference catalogue for producers.

The approach taken was to photograph the blemishes on a batch of 100 raw preserved skins prior to dispatch to a processor, in wet blue and again as the finished leather. The photographs were assessed for their value in informing the producer about the appearance and consequence of various blemishes.

Results and Discussion

Approximately 1000 digital images were collected of 20 raw skins from the batch of 100 bearing various faults. The corresponding wet blue and fully finished leather was also photographed.

Five examples of faults of interest that could be tracked and where images were sufficiently clear are presented below, as pairs of pictures of an area of raw skin and the corresponding finished leather. The images of wet blue were of limited value because of practical difficulties and are not included. This may in fact be a preferable point at which to compare the raw skins as the chrome tanned leather (either in the wet blue or crust state) is of uniform colour and surface gloss, and defects have not yet been hidden.
Figure 2 illustrates the effect of brown spot (a common bacterial infection) on the raw skin (left) and the finished leather. Even relatively minor lesions can cause severe pitting in the grain surface that is a major contributor to loss in value. Also evident is a tooth cut that when processed to finished leather created a hole. This would also result in complete loss of this area of the leather at significant cost.

Figure 3 illustrates the effect of recently healed teeth marks (left) in the final leather (right, arrowed), where they are clearly visible after finishing. Falling as they do in the central area of the main panel, the scars would have maximum negative effect on the value of the skin.

Figure 4 - Severe scale erosion.
Figure 4 shows one area of severe scale erosion similar to brown spot (Fig. 2 above), which results in a badly pitted grain surface (right, arrowed). However, other areas of scale erosion, particularly where it is associated with sloughing or abrasion, may look poor but nevertheless have little effect the finished leather. It is important to be able to distinguish the cause and depth of damage to determine whether it is a high priority for remediation.

**FIGURE 5 - Double scaling.**

Figure 5 shows the phenomenon of double scaling which appears to be due to retention of partially sloughed scales as the new scales are growing. It results in a distinctive crescent or circular impression in the finished leather (right, upper edges of scales) and may cover much of the skin area. Also present are numerous eroded and scarred areas.

**FIGURE 6 - Faint scars.**

Figure 6 demonstrates how even fully healed and very faint scars can still appear in the finished leather and oblige the tanner to apply a heavier or more opaque finish than would otherwise be needed. It is essential that as far as possible, cuts and lesions be prevented as even faint blemishes will show clearly in the most valuable pastel-coloured or lightly finished leathers.

The development of a catalogue of faults to provide some guidance to producers was heavily constrained by a number of factors. A handheld digital camera and flash or ambient lighting was used. This resulted in many images being of limited value.
because of flaring and shading effects. Photography of this type of substrate is very problematic and requires specialised equipment and controlled conditions.

Unfortunately, it was not possible to influence the finish applied to the various skins as the coating, colour and pigment were selected by the processor to hide the defects observed as far as possible to try to improve the leather value. Thus the surface gloss, opacity, depth and colour vary drastically from one sample to another and make photography very difficult. This illustrates very well how faults in the skin result in the processor having to apply more time and resources to produce a lower value, more heavily finished leather.