



Environmentally sound - the manufacture of dog-chews

Dog-chew products are an excellent way of adding value to lime splits. This is especially so when the flesh splits represent a high proportion of the splitting yield.

Although the prime focus should be on the grain split for leather, the pieces being converted into chew products need to be uniform. The optimum final substance is 2.0-2.5 mm, so the limed splits often need resplitting to approximately 3.0 mm. With very thick hides, such as buffalo, this means that in addition to the grain split, several uniform pieces can be provided from each hide.

Whereas a prime function of deliming in leather making is to release protein from the hide to ensure softness, with dog-chews these proteins can be retained. This not only increases the final weight yield, but also minimises the environmental load of any waste waters.

Hydrochloric acid is therefore used to a pH of around 7.0 as this provides a clean appearance. This can be supported by the bleaching action of hydrogen peroxide, also used to oxidise free sulfide carried over from unhairing.

Dog-chew products are part of a very competitive market, so it is critical to make maximum use of the raw material. The accuracy of cutting, and use of waste materials in higher value products, cannot be attained by working from the wet condition. Consistency can only be ensured when the delimed/bleached pieces have been taken to the dried state.

First time drying

The wet delimed pieces should be dried as soon as possible to avoid putrefaction. These pieces need to be flat and thus should be frame dried while being held under slight tension. Options for drying includes:

- Cold climates - toggle drying in units with forced hot air circulation.
- Hot climates - toggle drying, nailing onto wooden frames, stretching on wooden/steel/bamboo frames with twine lacing between the pieces and the frame structure.

The production of dog-chews

Essentially there are five categories of dog-chews, with many products in each class.

1. CUT PRODUCTS

The simplest example is flat strips, where the dried piece is laid flat and marked along the full length using a metal strip as a template. The piece is then cut into long strips using a band saw, placed together in bundles of perhaps 20-25, and cut into sections of about 15 cm length. Variations are squares of 5 cm side or triangles formed by cutting these squares diagonally. A table marked according to lengths required, or fitted with an



Wet delimed splits being nailed to shape on simple rectangular wooden drying frame set on a table.



The drying frames with dried pieces are shown suspended from a series of posts and rails. This area is covered with polythene to retain the heat and deflect any rain.





Tagging frames can be used for drying and forming twisted sticks. Bent nails or hooks are used to hold the pieces in place, as metal toggles tend to break.

adjustable guidance edge, is used for feeding the strips to the guarded saw blade.

2. CUT AND FORMED PRODUCTS

There are two main products:

Twisted sticks: A template is used for marking, with the dried piece cut into strips 1 cm wide. The strips are made up into loose bundles and soaked for about 30 minutes, that is until just wet back and workable. A nail or hook secures one end of the strip to the top of the frame, and a hook set in the chuck of an electric drill, fitted into a slot cut in the other end. The strip is first twisted using the action of the drill, then the hook detached; the strip is then pulled tight, and secured to the bottom of the frame using a nail or toggle. After drying, bundles of 20-30 strips are made up, the ends cut level, then cut to length using a band saw, and graded into thickness of 3-5 mm, 7-8 mm, 9-10 mm.

Knotted bones: There is considerable waste from dog-chew manufacture as, in addition to off-cuts, some dry pieces are too thin to be used. It is very important to use as much of this material as possible as part of high value products, as opposed to lower value (extruded) products.

Knotted bones are an excellent way of maximising the value of this waste, and manufacture starts by marking the dry pieces with a rectangular metal template, and cutting out. These pieces are wet back until malleable, then folded (not rolled) into a flat cylinder. Wet-back waste material is then placed in the centre between the parts where the knot will be formed. The bone is then folded, with the in-fill providing bulk to the centre part of the bone. The folded piece is then knotted to size and the ends trimmed. A table, with the surface marked where the knots are formed and the ends to be cut, is used to ensure that the bones are consistent.

As the centre will open up on drying, the bone is held together by either lightly tying the centre with string, or a bamboo strip is fitted across the centre and held under the inner edge of the knots. The bones are then placed close together on trays and dried in the sun for about two-three days. On the last day they are placed in a drying unit and force dried. Accuracy of final weight is determined by weighing the original cut rectangle, and building up the weight by using off-cuts. A ratio can then be



Pulverising for composite products. These pieces are too thin for use in high value products.

determined from the original dry weight and the weight of the trimmed knotted bone.

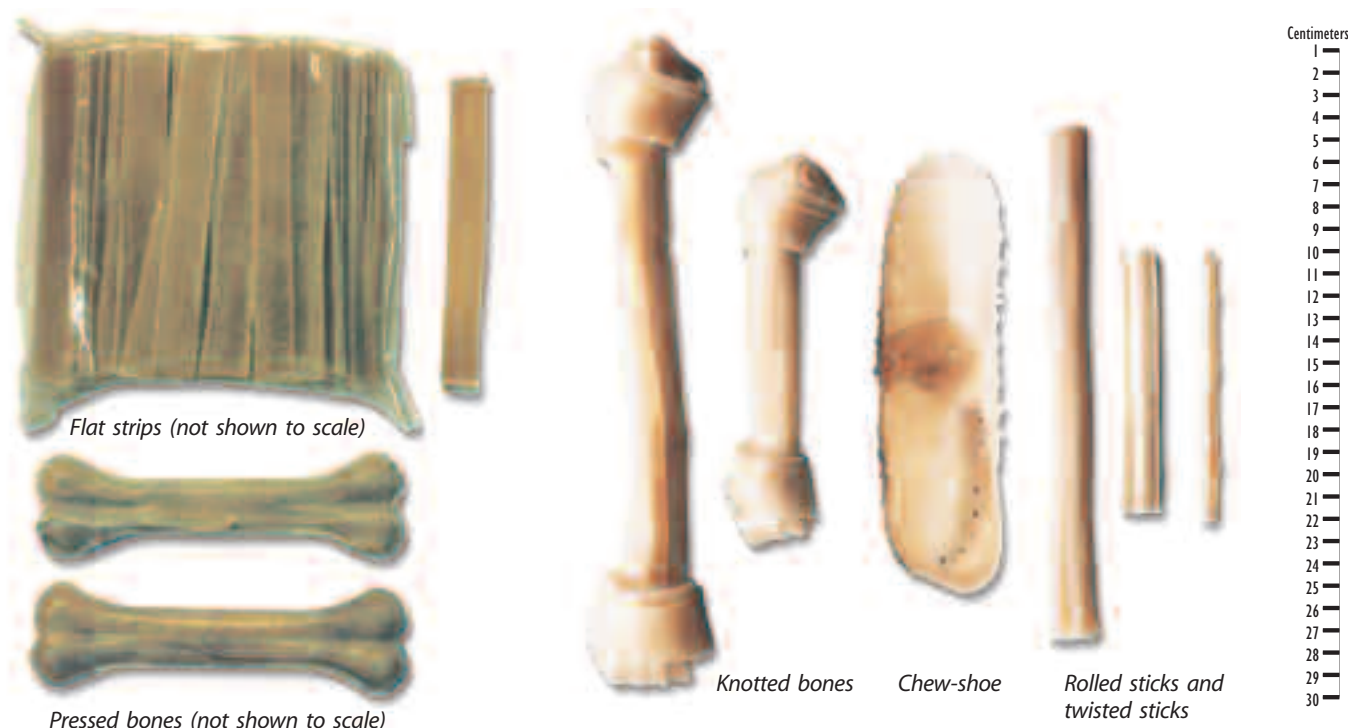
3. CUT AND PRESSED PRODUCTS

Pressed sticks (cigars): Rectangles are cut to size, and the weight is built up to the control weight by adding waste material as centre fill. The pieces are then wet back, placed together, tightly rolled, then placed into the bottom half of a cylindrical mould. The top section is pressed down in a simple bar press that exerts a pressure of about 50 tons. After one day drying, the stick begins to open but, if pressed a second time, the shape then holds throughout the rest of the drying.

Pressed bones: These are made in a similar way to the pressed sticks. With the edge of the bone facing up after folding, the ends are folded in to allow a build-up in bone shape during pressing.

4. STAMPED AND ASSEMBLED PRODUCTS

These are usually 'chew-shoes' in various sizes, and are produced by cutting out the major sections (sole, vamp and quarter) by die and press. The die should also cut out the holes for lacing the shoes together. These items may be packaged with raw hide strip for assembly in the country of receipt, where the higher labour rates offset the costs of transport. These products do not need wetting back for shape retention.



5. BLENDED AND EXTRUDED PRODUCTS (COMPOSITE)

All waste that cannot be used in the higher value products is either cut into small pieces and pulverised into chips, or softened by wetting, then mechanically ground into small pieces. This includes dust from band knife cutting, trimmings from knotted bones, and composite waste.

These grindings are then blended with tapioca flour as an extender, dry rice to give texture, and gelatine as a bonding agent. After blending, the mix should be as dry as possible, but be able to hold together. For guidance, the hide content is probably 80% in a good product, but might be as low as 60%. The only other additives that might be used are vegetable dyes, so the products are generally available as natural, yellow, blue, red and green.

The mix is then fed into a mixer or sausage-making machine, and the product extruded directly onto drying trays. Multi extrusion heads can be fitted to increase the rate of extrusion, with the extrusion nipped off at the tray length. To save drying time, when part dried and according to 'handleability', the lengths are cut to size, and drying continued.

Formed products can also be created from this material. If two extrusions of the correct size are pressed together and rough shaped, pressed products can be made.

Secondary drying

Most of these products need a secondary drying. In hot climates they can be placed on rectangular wooden frames covered with stretched chicken wire mesh, then placed in racks, or set out on the ground and sun dried. Wheels can be fitted so that the trays can be easily brought under cover, otherwise provision must be made to cover them in the event of rain.

Another technique is to use metal trays fitted with wire mesh. Heat is reflected from the metal base and speeds the drying. If rain falls, metal covers are placed over the trays, which also retain the heat.

In general, drying takes 2-3 days, then is completed by a forced drying of 1-day. Here, the trays are placed in racks in a room or building fitted with fans for good air circulation. Items converted to

this use can include portable cabins and old transport containers.

Product control

The key points for control are:

Moisture content: The moisture content should be less than 10-12%, otherwise there is the risk of putrefaction. This can only be controlled by close attention to operation, regular sampling and moisture determination.

Weight of final product: Although some variation between individual pieces will occur, multiple weighing must be used to assess the average weight of small final products. Larger items, such as knotted bones and pressed rolled sticks, must be made up to a set dry weight using the scrap material as described, and confirmed by continuous weighings.

Product shape: Uniformity of shape can only be ensured through close control during manufacture. In the case of knotted bones, the folding is very important so that the centre part looks very full.

The count: When orders are being made up, the count is critical. Control and spot checks can only cover this. Where small products are packed in high units, say 100 as in flat strips, random packages should be weighed.

Combinations of weight, count and size: Some combinations relating to these factors are given, but these will vary as manufacturers and customers set their own agreed standards.

100 Twisted sticks: Pieces at 3-4 mm - weight 380 gms; 7-8 mm - weight 640 gms; 9-10 mm - weight 940 gms.

100 Flat sticks: Pieces at width 1 cm - weight 1020 gm

Knotted bones: Piece at 12.5 cm - weight 52.5 gms

Chew-shoes: Shoe at 12.5 cm - weight 35 gms

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