

PPI

Processing & Product Innovation



Specialty Meals

Specialty meals covers a wide range of products that are currently being, or can potentially be, produced from animal by-products to meet market opportunities and increase the value of products that are currently undervalued. This undervaluing may be because they are currently:

- sold as a raw material yet have a greater value as a value-added meal;
- processed to an inedible mixed animal meal when they may be able to be processed in their own right to an inedible or edible meal of higher value;
- disposed of to waste, either as a solid or liquid, yet have some value as a processed meal.

Resource species-specific meals

Some rendering plants have taken the initial steps to address this by segregation of raw materials to produce species-specific meals from their existing resources. For example 100% ovine meal has a premium-priced niche established in the North American and European markets. While market niches such as this are currently few in number, the opportunities still exist for collaboration between the meat processing industry and further processors to identify and develop new niche opportunities.

The petfood industry is constantly seeking new materials with which it can produce new, and clearly identifiable, varieties within a product range. It is likely that they would welcome any meals that provide this opportunity.

User species-specific meals

Alternatively the niche opportunity can be based on the specific requirements of an end consumer. Opportunities have been identified for meals to meet the specific dietary needs of intensively farmed species of animal. In particular, significant potential growth has been identified for the use of meals, other

than fish meal, in the aquafeeds industry. Fish meal has been the traditional protein source for aquafeeds but there are significant shortfalls in future availability against projected requirements. Meat meals have been shown to be a useful substitute for fish meal in feeds for a number of marine species.

This area of opportunity is still relatively new and unexplored by the Australian rendering industry. The range of marine and terrestrial species that are intensively farmed is quite extensive. Many of these species have quite unique nutritional requirements and may provide opportunities for the development of new specialty meals based on either limitations in their composition, or limitations in the resource materials used. These limitations will be established by the nutritional requirements of the specific species that is targeted for intensive farming.

Development of such meals, and their market opportunities, requires close collaboration between meal processors, animal nutritionists and farmers. The development phase may be lengthy and difficult; however, the specialty meals could realistically be expected to achieve a premium price.

Meals from under-utilised raw materials

A number of products currently produced by abattoirs fail to realise adequate returns to justify their collection. In particular, many offals have a marginal return that may, or may not, warrant their collection, handling, packaging, freezing and storage costs. At many abattoirs offals are simply not collected because their value to the company as a packaged frozen product is no greater than their value as a raw material in a mixed animal meal.

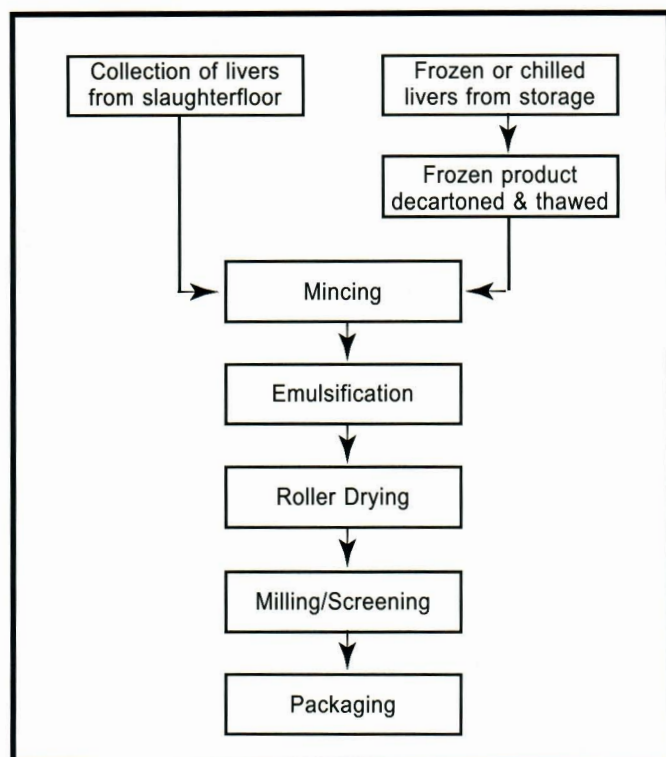
However, some of these have potential for value-adding to produce item-specific meals. For example liver meal has a small market for both edible and inedible use. Liver meal can be readily produced from fresh liver using simple equipment that is readily available. The process is shown in Figure 1.



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Figure 1. Schematic process for liver meal preparation



Mincing

The hole plate size for mincing should be as small as possible to achieve the maximum liquefying effect. Very small hole plate sizes (3 millimetre) can be used if the mincer plate and knives are very sharp and the feed worm is in good condition. Unfortunately the liver loses structure easily so that, if the feed worm or the plates and knives are at all worn, the material will be subject to severe slippage and will not be 'driven' through the mincer.

A larger hole size may reduce this slippage. Partially frozen liver can be minced to reduce slippage in the mincer; however, if the liver is inadequately thawed, the material can refreeze as it passes through the mincer—blocking behind the plate, or, as it exits the mincer. For ease of handling further along the process, it needs to be adequately thawed and liquefied.

Emulsification

It is important that the liquefied liver slurry is emulsified because, although it may appear liquefied and homogeneous after passing through a small mincer plate, it is likely to contain particulate and possibly stringy membrane material. This material may retain some moisture during drying, leaving particles with higher moisture content that may potentially support microbial growth.

This material has been successfully emulsified through a rotating disk colloid mill although other high shear emulsification equipment would be expected to perform the task adequately. No added water is required through the process as the material should become adequately liquefied to be emulsified effectively. Any addition of water would become an additional evaporation load while drying.

Drying

This material is ideally dried on a roller drier. As the material is a thick, viscous liquid, it easily forms a thick film on the drying drum and does not readily leak from between the applicator roller and the drying drum. Spray drying is not generally suitable due to the difficulties in creating an atomised spray from such a thick liquefied material. Fluidised bed and spout bed driers are also unsuitable due to the high viscosity.

Drum driers were prevalent in the dairy industry prior to spray-drying technology, and are still widely used in the food industry where viscous liquids are to be dried. A suitable drum drier is a versatile item of equipment for drying a wide range of products. The presence of a roller drier, in a further processing plant, would give a processor flexibility to process a wide range of specialist products including commodity-specific meals, meat powders, stickwater proteins and bone stocks.

Milling and screening

The material leaving the drum drier will initially be in the form of thin dry sheets. The sheets are fragile and will break into small flakes with a minimum of handling. Product can be packed and sold in this way as liver flakes, with flakes up to about 10 millimetres in diameter and less than 1 millimetre thick.

Alternatively the material is readily milled and screened to produce a light brown powder with a strong liver odour.

Yield and composition

As this material is pure dehydrated liver, it would be expected to yield approximately 37 kilograms of powder, at 5% moisture, from 100 kilograms of sheep liver; and approximately 35 kilograms of powder, at 5% moisture, from 100 kilograms of beef liver. Liver powder is a high protein, high fat, low ash powder that is high in vitamin content, and moderate in cholesterol content, when compared to other dried meats and offals. The predicted composition of the powder is given in Table 1.

Table 1. Proximate composition of liver powder

Component	Content in Beef	Content in Sheep
Moisture	5.0%	5.0%
Protein	57.4%	57.8%
Fat	24.7%	20.2%
Ash	4.0%	4.0%
Riboflavin	140 mg/kg	75 mg/kg
Niacin	270 mg/kg	295 mg/kg
Retinol	390 mg/kg	850 mg/kg
Ascorbic Acid	400 mg/kg	570 mg/kg
Cholesterol	0.8%	1.2%

Using conventional rendering the high fat content is difficult to recover as liver oil as the material is, at no stage of the process, in a form suitable for pressing. The fat could be recovered by solvent extraction, if necessary, but this is not essential as it appears well bound in the powder.

There is no documented evidence of other offals being dried to an edible or inedible meal in this way. However, there is little reason why other offals could not be treated in a similar fashion, to prepare other specialty meals—should suitable markets be identified. There have been indications of interest from petfood manufacturers, and feed millers producing feeds for fish, poultry livestock and elite species, such as mink. Other commodities that may be suitable for converting to meals are: heart, spleen, tripe and possibly kidneys, brains and lungs.

Meals from waste products

A number of materials that are not currently collected in any form, but exit the abattoir as waste products, may be of interest for conversion to specialty meals. Some interest has been shown in specialty meals prepared from rumen contents (which are currently land spread or composted), and from gut mucosa from casings processing (which currently is lost in the waste water stream).

Recovery of these materials—as a meal that returns some financial gain—would be of significant value as they are generally a liability, providing additional load to the abattoir's effluent streams.

The future of specialty meals

Some specialty meals have been investigated to a limited extent. Some, such as meals for aquafeeds, have been proven to have market opportunities. Other, such as liver meal, have been produced commercially but not developed into significant markets. Others are, as yet, generally untried and await an opportunity for processors and end-users to collaborate in investigating their potential.

Further reading

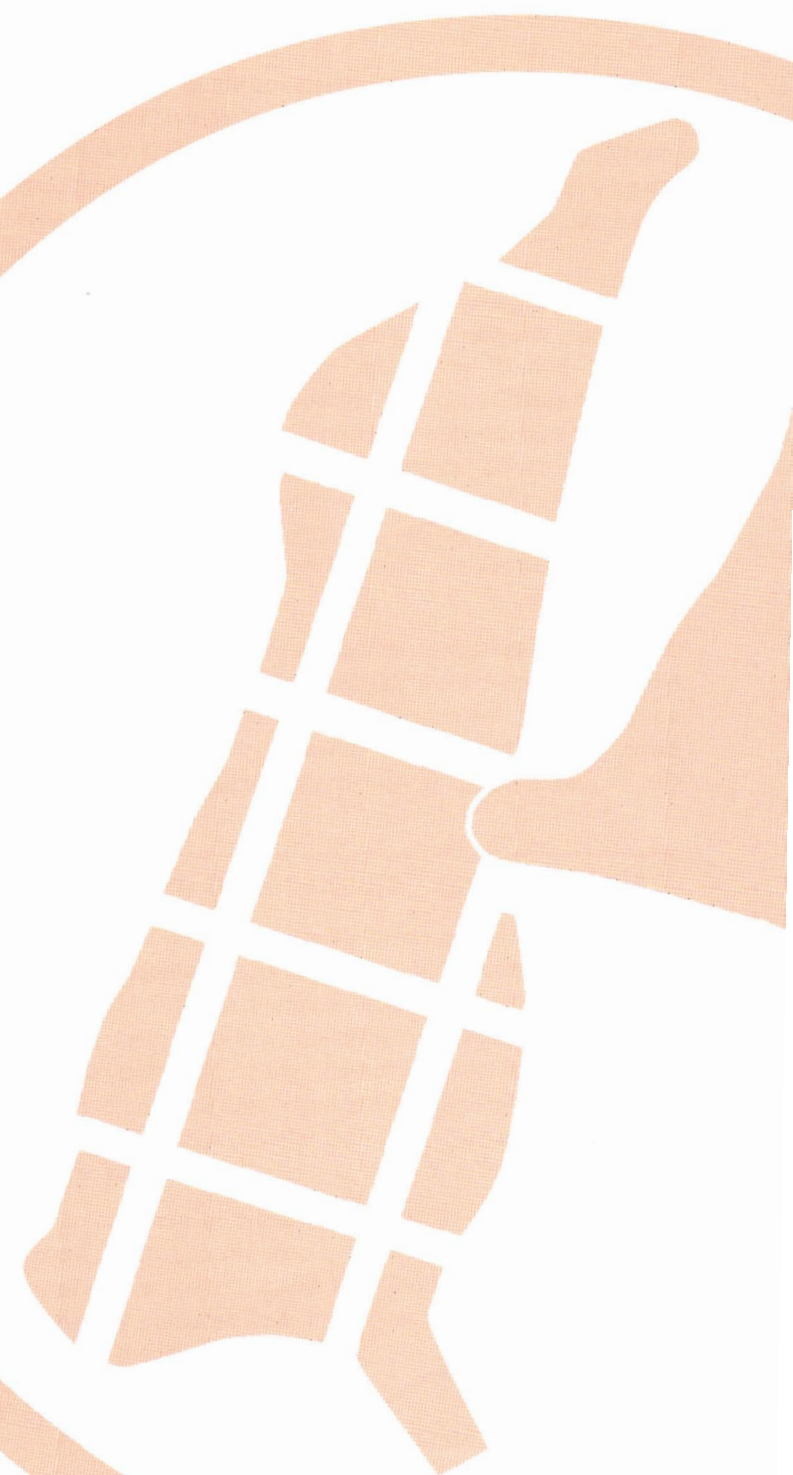
This brochure is a summary of information from the following project funded by the Meat Research Corporation.

- Project STR.008: Co-products Development

The final project report for Project STR.008 is available from Meat and Livestock Australia.

Related information is given in MLA Co-products brochures.

- Preparation of Meat Meals for Inclusion in Aquaculture Feeds
- Opportunities for High Ash Meat Meals as Organic Fertilisers
- Edible Meat Powders and Extracts
- Stickwater Recovery



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