final report

Project Code: A.COP.0073

Prepared by: John P. Friend

Date published: April 2012

PUBLISHED BY
Meat and Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Tallow Enhancement - Business Case Development

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government and contributions from the Australian Meat Processor Corporation to support the research and development detailed in this publication.

Contents

1 Introduction

Tallow is a key co-product of meat processing and is a potentially valuable source of fat for food manufacture. In the period since 2000 however there has been a concerted move in the food industry away from tallow, which has been driven by its high concentration of saturated fat and concerns over potential impacts on health. CSIRO Food & Nutritional Sciences (CFNS) were commissioned by MLA to prepare a comprehensive review of the technology available in the area of tallow modification. Subsequently CFNS also submitted a research proposal for the development of “healthier” tallows which if accepted by the food industry, might assist in arresting the tallow market decline.

It is possible from a technological standpoint to desaturate the fats, essentially converting them into “healthier” fats and oils, but there is little point in doing so if the potential industry commercialisers of such a product are unwilling to take the products to market. The aim of this project was to determine industry interest in “healthier tallows”, addressing the key aspects of economics, physical functionality, nutrition and flavour..

2 Methodology

With the assistance of CSIRO Food & Nutritional Sciences (CFNS) (particularly Dr Peter Watkins and Mr Rod Smith) a number of interviews were conducted in person or by telephone.

The organisations covered were

- abattoir/renderers
- service renderers
- oil/fat processors and marketers
- tallow traders
- bakery ingredient manufacturers/marketers; and
- food manufacturer's

3 Discussion of Key Findings

3.1 Manufacturing Trends

Food manufacturers generally have little interest in arresting the decline in their use of tallow. In fact such a reduction in use and associated reduction in the saturated fat levels is one of their significant technical objectives. This occurs under ongoing pressure from the supermarkets under the broad direction of the Australian Government Round Table on Nutrition & Health and the Heart Foundation.

Companies have largely eliminated use of tallow from their retail offerings; Simplot have found that such products look more wet (greasy) in the baking tray compared to those prepared in canola. Only in the food service area, where nutritional considerations are less important, does some tallow remain in the frying of potato chips.

The likelihood of Simplot using improved tallows is low and if so the saturated fat level would need to come down to something close to Canola's (7%) and be price-competitive with canola.

Companies still continue to utilise tallow based margarines in the pastries for pies; mainly in their apple pies where the pastry requires a different organoleptic quality/break compared to meat pies where vegetable oil based margarines are used.

Several points can be made here:

- For baking one cannot use soft oils; therefore the choice is between tallow or palm oil based margarines;
- Tallow based margarine gives a smoother melting range and a more plastic dough than that with palmolein and is therefore preferred by chefs and manufacturers for eg apple pies. However under pressure from the supermarkets, apple pies (home brands for example) with only vegetable oils are found in the freezer alongside similar products containing animal fat. In **Table 1** a number of products are compared; interestingly Nanna's (Patties) apple pies (600g.) listed animal fat (11.3% total fat, 5.3% sat fat) while a supermarket home brand apple pies (600g.) contained vegetable fats and oils (palm, palm kernel and sunflower) 14.3% total, 9.5% saturated fats. The latter interestingly allows the supermarket to stay "animal" free even though the total fat level is higher than Nanna's as is the % saturated fats as a

proportion of the total fats (66.45% vs 46.9%). It would therefore appear that the supermarket give greater weight to the vegetable oil label listing than to the fat levels. The Nanna's product price was $5.35, the home brand $3.99.

- Patties would be happy to consider replacing some/most of their usage of 1700 t/pa tallow with a lower saturated fat tallow subject to satisfactory performance in the final product.

A major manufacturer of baked products was interviewed and were generally rather negative, feeling that the consumer's negative perception about animal fats will be difficult to reverse particularly with an ongoing message from both the government and the supermarkets. They made the following points strongly:

- for frying applications blends of vegetable oils now have similar usage life to tallow, thereby removing one of tallow's claimed advantages;
- for pastries they only use vegetables oils in Australia and, for historical reasons, both vegetable oil and tallow are used in NZ; they claim that by use of butter flavour the mouth feel of vegetable oil based pastry and tallow based pastry are similar.
- Most of their pastry uses vegetable oil and they have no desire to move; they felt that their main competitor have a similar attitude for puff pastry in general.
- Even in meat pies there is a trend towards vegetable oil in the pastry; all part of trying to get the total level of animal fat down which is difficult to understand for meat pies.
- While Halal certification of tallow is not difficult, the need to segregate Halal from non-Halal adds another complication;
- A food ingredient manufacturer interviewed uses certified sustainable palm oil; Australian use is about 3% of the world's use; discussions are under way to ensure that as much certified palm oil as is needed by all Australian users will be available; some of bakery ingredient customers are buying green certificates.
- This food ingredient company is looking for alternatives to both tallow and palm;

Hence of the 4 food manufacturers above, Patties were the only one to show any real interest in the use of a “healthier” tallow.

3.2 Nutritional Considerations

- Patties have asked their supplier to investigate replacing palm oil with tallow in some of their margarine formulations. This is because of some concern that “sustainable” palm may be difficult to source. One baked good manufacturer however does not think supply of “green” palm oil will be an issue for Australia.
- Under the auspices of the Australian Government Round Table on Nutrition & Health, supported by the Heart Foundation, pressure continues to build to lower saturated fat levels. Because of this a meaningful reduction in the saturated fat level of a “healthy” tallow would be considered of value to Patties, who have indicated that they would be able to absorb some price increase for “healthier” tallow.

- In the food service area nutritional considerations are less important but could also build gradually if government supported education campaigns were initiated.
- The major challenge here will be to at least partially reverse the anti-animal fat message of decades.

3.3 Functionality

The only vegetable oil suitable for baking applications is palm oil and while adequate it is generally considered inferior to tallow based margarine. This is because the latter has a broader melting range and a greater plasticity more suitable in pastry applications. Clearly it will be important to aim to minimize any compromise of this functional advantage of tallow in a "healthier" derivative.

3.4 Flavour

- Traditionally it was felt that tallow fried chips had a superior stronger flavour than ones fried in vegetable oils. Today after a transition to vegetable oils over a number of years by both the fast food chains and food manufacturers, taste tests suggest that taste preferences have also transitioned and the cleaner potato taste of vegetable oil fried chips is now preferred.
- Over the 10 years or so of transitioning from tallow in fried and baked foods a number of flavours have been used to overcome possible consumer reaction to a changed frying medium for example. Today with the transition largely complete and the average palate adjusted, less of such flavour modifications are apparently needed. McDonald's in the US recently admitted that they had been adding a flavour containing meat extract to their vegetable frying oils; It is believed that this practice will now cease (it has not occurred in Australia).

3.5 Abattoir Renderers and Service Renderers

It was difficult to ascertain what overall level of interest there might be at the industrial level. Baiada, with a very good understanding of the Australian Renderers Association membership recommended 2 processor renderers as being key potentially interested parties.

Important comments made included:

- Issue for a rendering plant manager will be how difficult a new process is to manage, the fate of by-products, energy use, carbon tax impact etc
- One processor renderer suggested that if sufficient market interest had been demonstrated for a product/s to be developed by CSIRO/MLA, they would be interested in making an appropriate investment to allow manufacture, but that a payback hurdle of as little as 12 months may be required.
- They volunteered that one possibility could be a JV near a port to export much of the

improved product, the production by the JV being large enough to justify the necessary capital investment. Such an operation would need to collect clean fat from a number of plants to achieve economy of scale for a new process.

- Another meat processor felt that developing a healthier fat product would be a very hard sell all around including how to handle by-product.
- Any investment decision would of course be predicated on a robust analysis of manufacturing costs and markets following the R&D and pilot work necessary to establish costs and performance of the new “healthy” tallows.

3.6 Oil Processors

Tallow's low cost base remains attractive but a substantial reduction in its level of saturation would be desirable; if it was possible to reduce the level of saturated fats to LT 20% (and LT 1% trans f.a.) a Heart Foundation tick could be achievable with resulting marketing benefits.

One oil processor interviewed thought it unlikely that renderers would put in a new process for an improved tallow (costs, complexity of a new process, need to dispose of by-products generated).

Another however showed considerable interest and should be an important ongoing contact. They have all of the appropriate equipment to allow industrial manufacture of “healthy” tallows subject to passing all of the normal financial hurdles.

Their comments were:

- They have the capability to fractionate, interesterify (chemically) and hydrogenate; they currently do fractionate tallow; with 1 small speciality product which is an esterified tallow product; they carry out esterification on 2 vegetable oils (singly; and mixed); see no point in trans-esterification between a tallow fraction and a veg oil as the product cost would be too high for whatever functional or nutritional benefit might result. They have no experience of enzymatic trans-esterification.
- Heavy duty tallow frying oils are one of their oldest lines but falling away today with tallow mainly going into the baking and pastry areas.
- The nutritional side of their edible tallows is of lesser importance in the Asian countries to which they export (GT ½ exported).
- One of their speciality products is a tallow based butter replacer.
- They see 2 significant challenges for MLA/CSIRO to tackle:
    - remove the cholesterol
    - neutralise the perception that that tallow is less healthy than butter
- They were asked what premium pricing might be possible for a healthy tallow? There doesn't appear to be any easy answer apart from the fact that any increase in price would need to be related to improved functionality/composition. In Australia tallow is generally priced just below

palm stearin; above the latter come the other palm fractions followed by the soft oils. There are a number of price steps for healthy tallows to target.

- In terms of size (tallow usage/sales) they ranked GF as 1, Peerless 2, and Bakels (NZ) 3 in ANZ area.
- They feel that, however good the healthy tallows are, they will find it very difficult to penetrate unless there is a significant campaign to turn around the public and supermarket's negative health attitudes re animal fat. Without such a campaign one would be "flogging a dead horse".
- They wondered about the impact of mixed beef raw materials on tallow quality and the possible desirability of raw material segregation to produce a high quality tallow for further processing.
- Overall they want to be kept in the loop and would be happy to consider involvement in the project at the appropriate time.
- They would like to see tallow with a more upmarket image and with its cholesterol removed. They would like to see the word "tallow" replaced with a new word.
- Of the approximate figure of 40,000 tpa edible tallow used in Australia it was thought 6-8,000 tpa could go into baking and 15-20,000 tpa into heavy duty frying (mainly in food service).

3.7 Pricing

Table 2 gives the prices (US cents/lb) of the full range of relevant fats and oils. This shows that if edible tallow is taken as 100%, its main competitors of palmolein and canola are priced at 108% and 119% respectively.

On the assumption that a "healthier tallow" with its saturated fat level reduced to 30% could replace both unfractionated tallow and some palm oil without any loss of functionality, the question is "what premium in price could be contemplated?"

Fats currently contribute ca. 8 % to pie raw material cost and about 4% to total direct costs of manufacture. A 20% increase in tallow cost would therefore result in only a 1.6% increase in raw material cost and 0.8% in total direct cost. One baker interviewed felt that such an increase could be readily absorbed. As to whether a larger increase in tallow cost of say 50%, corresponding to an increase of 2% in total manufacturing cost, would also be absorbable, that would not be so easy to sell, but the idea was not rejected out of hand.

3.8 Market Size

It is possible that the availability of a low "sat fat" tallow will allow replacement of some of the existing tallow (more likely) and vegetable oil (less likely) used in baking while the frying market might also be penetrated to some extent.

It is felt that in the Australian market most sales of an improved tallow would be in partially replacing the existing tallow market (first in baking and then frying) and a lesser amount in replacing vegetable oils for baking applications.

It is unclear what export opportunities there may be for such improved tallows.

If one were to assume that 5,000 tpa of replacement of tallow occurs at a premium of $300 per t and new business of 5,000 tonnes at $1,300 per tonne were achievable, the additional revenue would be: $5,000x$300+$5,000x$1,300=$8m p.a.

The margins are very difficult to estimate without some input from an existing processor However for the sake of discussion let us assume, somewhat optimistically, that the $8M p.a. in additional sales generated a margin of 40% i.e. $3.2M and an EBIT impact of 20% i.e. $1.6M.

3.9 Benefits across the Value Chain

Possible benefits would accrue to the abattoir-renderer-processor combination, the split depending on the extent to which vertical integration of the processes of raw material segregation, rendering and tallow processing occurs.

Arrest of the ongoing decline in tallow usage should occur. The food manufacturer would benefit to the extent to which his volume and margins might be impacted by use of a “healthy” tallow.

4 Research Targets (if the project were to proceed)

These should be to:

Produce tallow fractions with sufficiently low levels of saturated fats to allow:

1. Sufficient marketing advantage e.g. 30% saturated fats
2. Functionality to be no worse than before tallow modification.

5 Conclusions

1. The CSIRO literature review (A.COP.0067) suggests that there is sufficient unencumbered technology available to produce tallow fractions with significantly reduced levels of saturated fats. Dry fractionation would probably be the easiest and most satisfactory route, but a decision would need to be made whether the associated higher concentrations of cholesterol in the olein fractions would require further treatment to avoid any marketing complications associated with such higher levels of cholesterol. The equipment and know-how to produce such tallow fractions at an industrial scale exists in Australia (Peerless, Goodman Fielder / Integro Foods).
2. The level of interest in the project ranged from low to moderate across the supply chain. The weight of opinion against use of animal fats, even at substantially reduced level of saturated fats, was generally felt to be a major stumbling block which could only be reversed by a substantial (and unlikely) public education campaign.
3. Penetration by “healthier” tallows would be more likely in the Food Service area where the focus on nutritional composition is less in the absence of labelling.
4. The size of the Australian market opportunity for “healthier” tallows is considered modest and it would therefore be necessary to explore export opportunities in an attempt to build a large enough total market to justify investment. However a view was expressed that as much of the current export of edible tallow goes to Asia, the health benefits of lower saturated fat levels will be considered of lesser interest in such markets.
5. Additional Australian sales alone of $8M and possible EBIT of $1.6M (see Market Size above) spread across the whole industry cannot justify the research and scale-up necessary to attempt commercialisation
6. For the above reasons it is not felt that a persuasive business case exists to support the proposed CFNS research.

6 Appendix

Table 1: Market Research Product Composition – Supermarket at Bondi

Product type	Frozen Pastry	Frozen Pastry	Meat pies	Savoury pastries	Meat&veg Pies	Apples Pies	Apple Pies
Manufacturer	Goodman Fielder	Goodman Fielder	Patties	Borgs	Sargents	Patties	Coles
Name of product	Pampas Filo	Pampas Puff	4+20	Borgs savoury		Nannas snack	Coles snack
	Pastry	Pastry		Pastries		apple pies	apple pies
Oils, fats	Vegetable	Vegetable	animal +veg	vegetable	animal +veg	animal fat	veg fats & oils
			in the marg		in the marg		(palm, palm kernel, sunflower)
Total fat %	3.8	16.3		13.7	10.9	11.3	14.3
sat fat	0.4	7.9		6.7	5.2	5.3	9.5
% sat fat	10.5%	48.5%		48.9%	47.7%	46.9%	66.4%
polyunsaturated	1.5						
monounsaturated	1.9						NB high sat% caused by use of
Trans fat		1.6					palm kernel oil (80% sats)

Table 2: Fats/Oils Prices from 'Trade News Service' 1/2/2012

	US cents/lb	
Non Edible Tallow	44	0.9
Palm stearin	48.4	0.99
Edible tallow	49	100.00%
Palm oil	52.4	1.07
Palm olein	53	1.08
Canola	58.2	1.19
Soybean	58.9	1.2
Cottonseed	60.7	1.24
Palm kernel	68	1.39
Corn	68	1.39
Coconut	80.5	1.64
Peanut	111	2.27