

**REPORT ON RESEARCH INTO THE PRODUCTION OF SMOKED SKIN-ON SHEEP MEAT****EXECUTIVE SUMMARY**

1. This paper reports on the investigations that have been carried out to develop a hygienic and safe procedure for the production of smoked skin-on sheep meat, with a view to putting forward a case for a change in EU law to permit the legal production of this product.
2. Currently a market exists for illegally-produced, smoked skin-on sheep meat. Illegal slaughter in unapproved premises carries significant risks to consumers of the resulting product through unhygienic practices, lack of controls on specified risk material and animal by-products, and lack of traceability.
3. The Board is asked to:
  - **note** that investigations of the potential additional food safety risks associated with production of smoked skin-on sheep meat indicate that it is possible to produce such meat safely and hygienically in slaughterhouses;
  - **agree** that UK Ministerial clearance should now be sought to an approach to the European Commission to request a change in EU law to permit production of smoked skin-on sheep meat for human consumption; and
  - **note** the timescale for securing such a change.

**FOOD SAFETY: HYGIENE & MICROBIOLOGY DIVISION**

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## REPORT ON RESEARCH INTO THE PRODUCTION OF SMOKED SKIN-ON SHEEP MEAT

### Issue

1. To:
  - inform the Board of the outcome of investigations to develop a hygienic and safe procedure for the production of smoked skin-on sheep meat; and
  - ask the Board to agree that UK Ministerial clearance should now be sought to an approach to the European Commission to request a change in EU law to permit production of smoked skin-on sheep meat for human consumption.

### Strategic Aims

2. This work aims to assist the Agency in achieving its strategic outcomes that food produced in the UK is safe to eat and that regulation is effective, risk-based and proportionate, and protects consumers from fraud.

### Background

3. EU hygiene legislation requires the complete skinning of the carcasses and other parts of sheep intended for human consumption, except for heads and feet. However, there is a market for illegally-produced sheep carcasses from which the skin (hide) has not been removed, to meet demand from certain ethnic groups within the UK. Such carcasses are commonly called “smokies”, as their production involves singeing or burning the fleece. Illegal slaughter in unapproved premises carries significant risks relating to unhygienic practices, lack of controls on specified risk material and animal by-products, and lack of traceability. The welfare of the animals slaughtered is also unprotected.
4. If production of smoked ‘skin-on’ sheep meat could be shown to be safe and made legal, there would be benefits for consumers in the safe production and wider availability of what is regarded as a traditional delicacy by some ethnic communities, particularly recent immigrants from Africa and parts of Asia.
5. The possible legalisation of the production of skin-on sheep meat for human consumption is of particular interest to the farming industry in Wales. The farming unions, National Sheep Association and other interested parties are keen for this to be expedited because of the potential benefit to the industry and wider rural economy. The Welsh Food Advisory Committee has discussed this issue on several occasions, most recently at its open meeting on 21 July 2009. The Committee has consistently concluded that the Agency should make every effort to progress at the earliest opportunity towards changing legislation to permit

lawful production of skin-on sheep meat once the necessary evidence base is established.

### **Legal considerations**

6. Legalisation of production of skin-on sheep meat could be achieved by amending the detailed rules for slaughter hygiene in the EU hygiene legislation<sup>1</sup> itself, in which case the change would apply across the EU. Alternatively, the EU hygiene legislation also provides both for the granting of exemptions from the detailed rules for slaughter hygiene and for the adoption of national measures that derogate from these rules. If either of these alternatives were adopted, the resulting product would be restricted to the domestic market. As an amendment to the EU legislation itself would have universal application and enable product to be traded freely, this is the preferred approach.
7. Any case for a change in the law to allow production of skin-on sheep would, irrespective of the legal mechanism used, require a case to be made to the European Commission supported by evidence that such a change would not affect the achievement of the objectives of the EU legislation.
8. The European Commission has responded positively to informal contact from FSA officials and has indicated that an amendment of the EU legislation could be appropriate, as interest would be unlikely to be limited to the UK.

### **FSA-funded studies to assess risk to consumers**

9. The FSA has funded a range of studies to investigate whether the production of smoked skin-on sheep meat would pose any additional risk to consumers. In November 2003, the FSA commissioned research to assess whether it is possible to produce smoked skin-on sheep carcasses safely and hygienically in slaughterhouses. This work, published in a peer-reviewed scientific journal in 2007, developed a production procedure for smoked skin-on sheep carcasses that meet both an acceptable hygienic standard and consumer requirements. It also provided evidence to support the development of a meat inspection protocol for skin-on sheep carcasses.
10. Subsequently, in 2005 the FSA commissioned work to investigate whether veterinary medicine residues could pose a risk to consumers of skin-on sheep meat. This study concluded that insufficient data existed to assess skin-on meat for certain medicines.
11. Following an independent review<sup>2</sup> of both pieces of work in March 2007, the FSA commissioned further work to address the gaps in knowledge. Research started in February 2008 to investigate whether detectable residues from certain

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<sup>1</sup> Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin

<sup>2</sup> [Proceedings on the review of the M01 Meat Hygiene Research Programme - 26 - 27 March 2007](#)

authorised veterinary medicines are present in 'skin-on' sheep feet (as these are legally available for human consumption in the UK) compared with the set maximum levels in muscle and fat.

12. A report of this work has been circulated to the members of the Veterinary Residues Committee (VRC). The Committee was invited to consider the evidence and provide an opinion on the FSA's initial conclusion that compliance with existing controls on the use of authorised veterinary medicines by producers in the sheep meat production chain would provide adequate consumer protection for both skin-on sheep feet and smoked skin-on sheep meat, should it be legally available.

13. The overall view of the VRC was that:

- "based on the evidence of the report, the FSA were justified in their conclusion; and
- if the EU gives permission for the 'skin-on' sheep to be marketed, the FSA should undertake a period of enhanced surveillance for residues in this product".

The VRC commented that "the report is necessarily based on a limited data set and it could give extra confidence to consumers if the 'skin-on' sheep were tested for residues. This could establish that the report was correct in considering there to be little risk to consumers eating meat from such animals".

If production of skin-on sheep carcasses were legalised, the European Commission may impose a statutory requirement for residue surveillance via the Veterinary Medicines Directorate's statutory surveillance programme to ensure any residues of authorised veterinary medicinal products are at acceptable concentrations. Depending upon the outcome of any EC requirements, the FSA would need to consider whether or not to carry out any further surveillance in this area based upon a risk assessment using current evidence. The views of the VRC would be taken into account in deciding the approach taken.

14. The FSA has also considered whether the process for producing smoked skin-on sheep carcasses would cause harmful chemicals to be present in the product. Although the burning process is undertaken to remove the wool, the smoked flavour imparted to the meat is considered desirable by consumers. The main smoke-derived chemicals that have been identified in other smoked food and considered in relation to risk are polycyclic aromatic hydrocarbons (PAHs), some of which are genotoxic and carcinogenic.

15. The FSA funded testing of samples of skin-on sheepmeat to assess compliance with current limits for PAHs and also to measure levels of other harmful chemicals currently being considered by the European Food Safety Authority (EFSA). The samples were taken from the six sheep processed in an abattoir trial of smoked skin-on carcass production following the specifications developed

in the research project. The findings suggest that the level of PAH /harmful smoked chemicals derived from the smoking process in these samples are at a level that would be considered of low concern to human health.

16. Further details of the scientific work carried are at Annex 1.

### **Impact and sustainability**

17. Apart from the benefits of improved consumer safety and choice, legalisation of production of smoked skin-on sheep meat would have positive impacts in relation to the economic benefit to industry and reduction in incentive for crime. As a result, a reduction in the cost of combating illegal production of “smokies” would be likely. The welfare of animals at slaughter would also be better protected. There would be little environmental impact, save that correct disposal of animal by-product from legal production of skin-on sheep would be assured.

18. An investigation into the potential demand for ‘skin-on’ meat should it become legally available has been undertaken for Hybu Cig Cymru (Meat Promotion Wales) with support from FSA. The resulting report<sup>3</sup> found that the West African community (particularly Nigerians) would be the main consumers. The vast majority of West Africans living in the UK were estimated to live in London, while other cities in which demand for this meat type could be anticipated are Birmingham, Cardiff and Leeds. The total population likely to consume the product was estimated at 150-240,000. The potential demand for ewe carcasses for production of skin-on meat was estimated to be up to 155,000, or 25% of Welsh ewes slaughtered each year. These would otherwise be of a low commercial value (to both the farmer and retailer).

19. With an estimated premium of £20 per carcass for ‘skin-on’ over conventionally-processed mutton carcasses, the total potential additional revenue for the Welsh red meat industry (retailer, abattoir and producer) was estimated at approximately £3.1 million per year (although in practice the benefit would be likely to be spread more widely across the UK industry). This figure does not take account of the costs of the equipment required to produce smoked skin-on carcasses or any additional processing cost.

20. There is no available information to estimate the overall scale of illegal production of smokies. Investigation into smokies-related activity is intelligence-led. Intelligence suggests that there are separate criminal gangs involved in smokie production in a number of local authority areas in Wales. The Welsh Food Fraud Coordination Unit has advised that currently there are three cases in Wales relating to illegal smokies activity that have recently been heard and are awaiting sentencing in Swansea Crown Court. Additionally an incident is being investigated by an authority in the London area relating to a consignment of

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<sup>3</sup> *An appraisal of the opportunities in the ‘skin-on sheep meat’ market for Wales* by MLCSL Consulting, July 2009

smokies discovered unattended in a vehicle last year. Cases have previously been investigated in Scotland and elsewhere in the UK.

### **Next steps**

21. The next step, subject to FSA Board agreement, is to seek Ministerial agreement to a formal approach to the Commission with the case for legalisation of production of smoked skin-on sheep meat. A dossier setting out the case is in preparation and could be despatched to the Commission as soon as clearance is received.

22. Changing the EU legislation will require the Commission to propose a suitable amendment. Before agreeing to do so, we expect the Commission to consult EFSA. Provided EFSA's response is favourable, a qualified majority of member states in favour of any proposal for change would also be required. The entire process of securing the necessary change may be expected to take 1 to 2 years.

### **Board Action Required**

23. The Board is asked to:

- **note** that investigations of the potential additional food safety risks associated with production of smoked skin-on sheep meat indicate that it is possible to produce such meat safely and hygienically in slaughterhouses;
- **agree** that UK Ministerial clearance should now be sought to an approach to the European Commission to request a change in EU law to permit production of smoked skin-on sheep meat for human consumption;
- **note** the timescale for securing such a change.

## CHRONOLOGICAL SUMMARY OF THE SUPPORTING SCIENTIFIC EVIDENCE FOR THE PRODUCTION OF 'SKIN-ON' MEAT

### 1. A practical investigation into the hygienic production of skin-on sheep carcasses

- 1.1 This study was undertaken in 2003 to 2005 at Bristol Veterinary School. The main aims were to:
- produce a production protocol based on HACCP principles and good hygienic practice for skin-on sheep carcasses that have the quality attributes required by the potential consumer;
  - assess whether the carcass and deboned smoked meat produced following the protocol was acceptable to consumers who are accustomed to eating this type of meat in their countries of origin; and
  - produce information to assist the Food Standards Agency in the development of an adapted meat inspection protocol as part of official controls for skin-on carcasses.

### Conclusion

- 1.2 The study demonstrated that it was possible to produce smoked, skin-on sheep carcasses that had lower microbial counts than conventionally-dressed sheep carcasses produced in the same abattoir. The key factors in this process were:
- a starting wool length of not more than 5 mm;
  - using gas burners to singe and remove the wool;
  - pressure washing the carcasses to remove the charred wool; and
  - a final 'toasting' pass of the burners after carcass dressing and handling procedures are completed.
- The resulting smoked carcass and smoked meat product was acceptable (in relation to colour and odour) to consumers who were accustomed to this meat type. The boned and cubed smoked meat product had a similar shelf life to fresh lamb meat.
- 1.3 A 12-month survey in a commercial abattoir of lesions and defects that might be obscured by leaving the skin on, occurring in older sheep that would be suitable for smoked skin-on production, indicated that abscesses predominate. This information has enabled a protocol for the inspection of smoked skin-on carcasses to be developed.

## **2 Assessment of the available information regarding the consumption of skin-on sheep meat treated with veterinary medicines**

- 2.1 A desk study was commissioned to assess the available information from published and unpublished sources concerning medicines licensed for use in sheep produced for meat. The study investigated how their withdrawal periods were calculated and whether these limits would protect consumers from any harmful effects from skin-on smoked meat products.

### **Conclusion**

- 2.2 The study concluded that it was unlikely (though not certain) that antibacterial, vaccines and miscellaneous products given to sheep would pose a significant risk to skin-on meat consumers due to their frequency and methods of application. This was also true of benzimidazole and levamisole based anthelmintics. Topically-applied ectoparasiticides and macrocyclic lactone based anthelmintics, drenches or injections may constitute a risk mainly due to their method of application and/or lipophilic activity.
- 2.3 The study also identified that there was insufficient knowledge on the occurrence and control of veterinary medicines in sheep skin/skin fat and concluded that there was insufficient data to assess 'skin-on' meat for certain medicines, and that "some topically applied ectoparasiticides and anthelmintics could possibly result in residues considered to be a risk to a consumer of 'skin-on' meat" and suggested further practical work was required to enable an assessment be undertaken.

## **3 Prevalence of parasiticide (and other relevant veterinary medicine) residues in 'skin-on' sheep feet produced in the UK**

- 3.1 This study was commissioned in response to the findings from the desk study and following discussion with the external peer reviewers for the FSA meat hygiene research programme.<sup>4</sup> The study investigated whether residues from authorised veterinary medicines were present in skin-on sheep feet above the set maximum residue levels (MRLs) in muscle and fat.
- 3.2 Sheep feet with the skin on (which are scalded, dehaired and toasted) are legally available for human consumption in the EU and are produced in GB abattoirs under MHS supervision. The production process for sheep feet is similar to the process foreseen for the smoked skin-on carcasses (which were not available to be tested as they are illegal to produce). In the absence of other samples, skin-on sheep feet were considered to be the most suitable available testing medium, although it is accepted that the skin on the feet may

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<sup>4</sup> <http://www.food.gov.uk/multimedia/pdfs/reviewm01.pdf>

not be totally representative of the skin on other parts of the carcass with respect to veterinary medicine residues.

### **Survey results**

3.3 Overall, residues were detected in 1% (3 in 300) of samples tested. The level detected was above an EU MRL in only one sample (0.33%). This detection and MRL exceedance rate is comparable to that found during routine monitoring of veterinary medicines within the UK.

### **Risk assessment**

3.4 As the levels of consumption of sheep meat needed to exceed safety levels for the veterinary medicine for which the MRL was exceeded (diazinon) considerably exceeds normal consumption, it was concluded that the amount of diazinon detected in this sample of skin-on sheep feet would not present any risk to the health of consumers.

### **Study of cypermethrin incurred samples**

3.5 In an unrelated study, funded by the Veterinary Medicines Directorate (VMD), to investigate the potential contamination of water courses, six sheep were treated with the veterinary medicine cypermethrin and then half had their feet washed. All six sheep were euthanised after 3 days, well before the normal withdrawal period. Through an agreement with the VMD, samples of feet and fleece were made available to the project undertaking the survey of sheep feet.

3.6 In order to investigate what effect the process for production of smoked skin-on sheep meat has on cypermethrin residues, the samples were separated into two: one portion was tested without further processing (control) and the second was subjected to a process simulating the proposed 'skin-on' sheep meat process (treated) and then tested.

## **Results**

### Feet

3.7 Washed animals had lower concentrations of cypermethrin compared to non-washed animals and generally the treated samples contained lower amounts of cypermethrin residues than the controls.

### Fleeces

3.8 The mean concentration of cypermethrin was higher in foot-washed sheep than in the unwashed sheep. The mean residue concentrations in the control and treated samples were similar. The higher residue finding in the foot-washed sheep was not expected and cannot be explained.

## **Conclusion**

3.9 The simulated skin-on sheep processing appeared to reduce but not eliminate cypermethrin.

### **Overall study conclusion**

3.10 The results from the survey of skin-on sheep feet and the risk assessment of the positive survey result lead to the conclusion that existing controls on the use of authorised veterinary medicines, when complied with by producers, will in all likelihood provide adequate consumer protection for both skin-on sheep feet and skin-on sheep meat should it become legally available.

### **Advice from the Veterinary Residues Committee (VRC)**

3.11 The VRC were invited to give their opinion on the FSA's initial conclusion. Their view was that the FSA's conclusion was correct. The Committee also suggested that, if skin-on sheep meat were permitted to be produced, enhanced surveillance for veterinary medicines residue should be undertaken to confirm the conclusion.

## **4 Trial to produce smoked skin-on sheep in a commercial abattoir under MHS supervision**

- 4.1 In August 2009, an abattoir trial was undertaken by the National Sheep Association (NSA) and the Association of Independent Meat Suppliers (AIMS), with the assistance of the Food Standards Agency (FSA) and under Meat Hygiene Service supervision. See Annex 2 for a summary and illustrations of this process.
- 4.2 A protocol for the trial describing how the production process for skin-on sheep should be undertaken and how the carcasses should be inspected was drawn up using the information from the research undertaken for the FSA by Bristol University combined with advice from those within the industry who have knowledge and understanding of the traditional process.
- 4.3 Six smoked skin-on carcasses were produced by the process, which involved singeing to burn the wool, pressure-washing to remove the burnt wool and a final light singe after the carcasses had been inspected. The finished product was inspected by a traditional-products shop keeper who originates from Ghana and is accustomed to smoked skin-on sheep meat. The standard of all six carcasses was found to be very authentic and satisfactory.

### **Proposed post mortem inspection of smoked skin-on sheep carcasses**

- 4.4 The condition most likely to be undetected by traditional inspection of skin-on carcasses is abscess. No reliable data has been identified to point to the parts of the external carcass surface where abscesses most commonly occur. However, the neck/shoulder area, as a likely injection site, may be more likely to contain abscesses.
- 4.5 It is therefore recommended that, in addition to routine visual inspection of all external/internal carcass surfaces, the post-mortem inspection procedure for

smoked skin-on sheep carcasses should include routine palpation of shoulder and neck area. This may be reviewed in the light of new evidence and data collected by the MHS.

- 4.6 The six carcasses were inspected following the proposed protocol. The MHS concluded that there is no evidence to suggest that the process is in any way detrimental to the validity of post-mortem inspection.
- 4.7 Other MHS observations on the process were:
- the skin-on process appears on the basis of observation during the trial to be a viable proposition;
  - some technical issues will need to be considered and assessment made of the possible risks in each abattoir - problems to be resolved include how to contain the aerosols from the wash water and the smoke and burnt wool from the scorching. It might be necessary to carry out the torching/washing process in a dedicated facility, separate from the main slaughterhall;
  - it may well be that the risk of contamination of meat by skin-borne pathogens is significantly reduced by the process.

## **5. Study of harmful chemicals associated with smoked meat**

- 5.1 Although carried out primarily to remove the wool, the burning/singeing to produce smoked skin-on sheep could be considered a smoking process. Smoking food results in the presence of a range of smoke and heat-derived chemicals in the food, which may present some risk to consumer health. The main chemical components of smoke that have been identified and considered in a risk context are polycyclic aromatic hydrocarbons (PAHs), some of which are genotoxic and/or carcinogenic.
- 5.2 An evaluation by EFSA in 2008 identified 16 genotoxic and carcinogenic PAHs. EFSA concluded that there was a low concern for consumer health at the average estimated dietary exposure. However, high-level consumers are close to or at the levels proposed by the EFSA Scientific Committee as indicating a potential concern for health and a possible need for risk management action.

### **Maximum levels of PAHs in smoked food**

- 5.3 Current EU legislation, based on a Scientific Committee on Foods opinion from 2002, requires producers of smoked meat to comply with a maximum level for benzo(a)pyrene (BaP) of 5 µg/kg wet weight. BaP was used as a marker for the carcinogenic PAHs. The more recent EFSA opinion, based on newer data, has suggested that BaP alone is not a suitable indicator for PAH contamination and has recommended that new PAH limits be based on BaP together with three other PAHs, (benz(a)anthracene (BaA), benzo(b)fluoranthene (BbF) and chrysene (CHR)). The approach favoured by the Commission will be to have limits for BaP and the sum of the four.

### **Samples taken for analysis**

- 5.4 Samples of smoked skin-on sheep meat taken during the abattoir trial were tested by the Food and Environmental Research Agency (Fera) for a range of harmful chemicals associated with "smoked" food. The analysis was for 27 compounds including the 16 PAHs listed by EFSA as being of concern for health. The testing was undertaken to assess compliance with the limit for BaP in smoked meat, as well as to provide information on other PAHs of interest.

### **Results**

- 5.5 The levels of BaP were all well below the current limit of 5ug/kg and ranged from not detected (<0.09 in nine samples) to 0.75ug/kg. The sums of the levels for BaP, BaA, BbF and CHR ranged from <0.5 to 10.74 ug/kg, although only two samples were above 5 ug/kg. In both cases the high result was due to an atypically high level of BaA. Possible reasons for this will be investigated. Otherwise, the levels and profiles are characteristic of traditionally-smoked meat products.

### **Study conclusions**

- 5.6 These findings indicate that the concentrations of harmful smoke-derived chemicals in the samples taken from six sheep processed under a range of typical conditions are at a level that would be considered of low concern to human health. It should be noted that these chemicals would not normally be detectable in fresh meat and are therefore introduced as a result of the process.

**Summary and illustrations of the process undertaken in the August 2009 abattoir trial to produce smoked skin on sheep carcasses**

Six clipped Welsh ewes at the end of their productive breeding lives (6-7 years old broken-mouthed ewes) were slaughtered following normal procedures.

Following bleeding the sheep were double leg shackled to make it easier for burning (Figure 1) and two hand held burners used to singe the carcasses from the top down (Figure 2).



Figure 1 Clipped ewe carcase before scorching



Figure 2 The scorching process

The next process step was pressure-washing the carcase to remove the burnt wool and expose the golden brown smoked sheep skin. Figure 3 shows the washing process and Figure 4 the final washed carcase.



Figure 3 Pressure washing the carcass to remove the burnt wool



Figure 4 Washed carcass draining before further dressing

After leaving to drain, the carcass was moved to the area of the abattoir where dressing work post fleece removal is normally undertaken and the intestines, stomach and thoracic organs of the carcass were removed in line with normal dressing practice.

The head was then removed, the carcass split and the spinal cord removed as specified risk material in line with existing regulatory requirements. Following inspection and marking to simulate the identification mark, the skin surface of the split carcass is “toasted” to dry the carcass surface and to produce an even golden colour as shown in Figure 5.



Figure 5 The final carcass following toasting

**REPORT ON RESEARCH INTO THE PRODUCTION OF SMOKED SKIN-ON SHEEP MEAT**

**Glossary of terms**

<b>Skin</b>	The entire tissue forming the outer covering of the animal, except the wool
<b>Skin-on</b>	Describes the carcass/meat of a sheep from which the skin has not been removed following slaughter, as currently required by EU food hygiene legislation
<b>Smoked</b>	Describes the “skin-on” carcass or meat of a sheep which, following slaughter, has been subjected to a burning or singeing process to remove the wool. (This process is not “smoking” as normally understood, whereby food is flavoured, cooked or preserved by exposing it to the smoke from burning plant material, and the meat remains raw.)
<b>Smokie</b>	Illegally-produced smoked skin-on sheep carcass