International Perspectives

What is meat in Australia?

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Implications

• In 2014, Australia was the highest consumer of “meat” (defined as beef, pork, chicken, and lamb) in the world, consuming 90.21 kg of meat per capita per year.

• The definition of “meat” in Australia is diverse and varies widely among consumers, health professionals, and regulators.

• To the consumer, flesh/tissue from all living animals is considered meat, and the “most meaty” to “least meaty” was beef/sheepmeat/pork > chicken > hamburger/salmon/trout > crayfish > heart > kidney/liver/pig trotter > tripe/cultured meat > witchetty grub/grasshopper/brains. Burgers made from vegetable protein were considered “not meat.”

• From the point of view of the health professional, only red meat (muscle from beef, sheep, goat, kangaroo, camel, deer, pig or rabbit carcasses) is considered “meat,” and poultry, fish, and offal (internal organs of the carcass such as brain, heart, kidney, liver, pancreas, spleen, thymus, and tripe) are considered “not meat.”

• To the regulator, fish is not described as meat whereas all poultry and red meat is considered “meat.” Food Standards Australia New Zealand (FSANZ) code classifies offal as non-meat, whereas the FSANZ Primary Production Processing Standards consider offal as meat.

• It may be prudent for Australian regulators to consider standardizing their descriptions of meat.

• Health professionals appear to use different definitions for “meat” compared with both consumers and regulators. This is likely because they consider any food from a nutritional point of view.
Introduction

Traditionally, Australia had a strong rural heritage, dominated by large servings of meat. Recently, Australia could claim to be the biggest meat-eater in the globe, surpassing the USA in 2014, which had not occurred since 1982 (Sydney Morning Herald, 17 Oct. 2015; data derived from OECD, 2015). In 2014, Australians devoured 90.21 kg of meat (here defined as beef, pork, chicken and lamb) per capita. This increase has mostly been driven by an increased appetite for pork and chicken. The livestock industries in Australia, including the beef cattle, dairy, sheep, pig, and poultry industries, account for 45% of the gross value of Australian agricultural output (Keogh et al., 2015). The livestock industries generate farmgate returns valued in excess of $AUD 22 billion (Keogh et al., 2015). In 2016, Australia exported 1285.073 tonnes (slaughter weight) of beef, consisting of 70% of the national beef production (Meat and Livestock Australia, 2017).

The barbecue has been familiar to Australians since the 1920s, and the largest barbecue, in 1934, roasted 27 whole bullocks, in celebration of the centenary of settlement in Melbourne and the finish of an air race from London to Melbourne (Wells, 2015). The feature of a barbecue traditionally was the meat; sausages, lamb chops, and beef steak although, more recently, chicken and prawns are included. Thus, meat in Australia is usually center of the plate, and supermarkets often use meat as a “loss leader.”

The definition of “meat” in Australia is diverse, and the aim of this paper was to explore the definition with consumers and also to describe the definition given by health professionals and regulators.

Regulators

Food Standards Australia and New Zealand (FSANZ) is an independent statutory agency established by the FSANZ Act 1991. It is part of the Australian Government’s health portfolio. The standards in the FSANZ Code are legislative instruments under the Legislation Act 2003. The authoritative versions of these standards are in the Australian Government Federal Register of Legislation. Food regulation authorities in Australia and New Zealand work together to ensure food regulations are implemented and enforced consistently. Food Standards Australia and New Zealand does not provide advice on compliance with the code. Compliance with the code, enforcement, and interpretation of the code, for all foods, is the responsibility of authorities in the states and territories.

In Australia, the food standards code, developed by FSANZ, is divided into four chapters (www.foodstandards.gov.au; FSANZ 2015). The code regulates the use of ingredients, processing aids, etc. in Chapter 1 and specifically covers the composition of some foods such as cereals; meat, eggs, and fish (see below); and fruit and vegetables in Chapter 2. Chapter 3 describes the food safety standards.

Specific to Australia, not New Zealand, FSANZ has broader coverage and prepares standards across the food supply chain. Thus, Chapter 4 (FSANZ, 2017) describes Primary Production Standards (PPS) for agricultural commodities including seafood (see below), poultry meat (see below), meat products (see below), dairy products, eggs and egg products, seed sprouts, and wine.

The elements of FSANZ in Chapters 2 (code) and 4 (Primary Production Standards) relevant to meat are described below.

FSANZ Food Standards Code 2.2—Meat, eggs, and fish

Meat and meat products (code 2.2.1). In the FSANZ Code 2.2.1 (FSANZ, 2016), meat and meat products have clear definitions, which are listed alphabetically, as per below (see Table 1 also):

- **cured and/or dried meat flesh in whole cuts or pieces** means meat flesh including any attached bone containing no less than 160 g/kg meat protein on a fat-free basis.
- **manufactured meat** means processed meat containing no less than 660 g/kg of meat.
- **meat** means the whole or part of the carcass of any buffalo, camel, cattle, deer, goat, hare, pig, poultry, rabbit or sheep, slaughtered other than in a wild state, but does not include:
  a) the whole or part of the carcass of any other animal unless permitted for human consumption under a law of a state, territory or New Zealand; or
  b) avian eggs, or fetuses or part of fetuses.
- **meat flesh** means the skeletal muscle of any slaughtered animal, and any attached:
  a) animal rind;
  b) fat;
  c) connective tissue;
  d) nerve;
  e) blood;
  f) blood vessels; and
  g) skin, in the case of poultry.
- **meat pie** means a pie containing no less than 250 g/kg of meat flesh.
- **offal** means those parts of the carcass such as blood, brain, heart, kidney, liver, pancreas, spleen, thymus, tongue, and tripe, but it excludes meat flesh, bone, and bone marrow. (Thus offal and meat are defined separately, and offal is not considered to be meat.)
- **processed meat** means a meat product containing no less than 300 g/kg meat where meat either as singly or in combination with other ingredients or additives has undergone a method of processing other than boning, slicing, dicing, mincing, or freezing, and it includes manufactured meat and cured and/or dried meat flesh in whole cuts or pieces.
- **sausage** means meat that is minced, or comminuted meat or a combination thereof, which may be combined with other foods, encased, or formed into discrete units, but it does not include meat formed or joined into the semblance of cuts of meat.

Fish and fish products (code 2.2.3; FSANZ, 2016). In this code, fish is defined as a cold-blooded aquatic vertebrate or aquatic invertebrate including shellfish, but it does not include amphibians or reptiles. There is no reference to fish as “meat” in this section.
FSANZ primary production and processing standards

Food Standards Australia and New Zealand (FSANZ) have Primary Production and Processing Standards (PPPS) and of relevance here are the PPPS for Seafood (4.2.1), Poultry Meat (4.2.2), and Meat and Meat Products (4.2.3) (FSANZ, 2017; Table 1). The PPPS are for agricultural commodities and were written to strengthen food safety and traceability throughout the food supply chain from paddock to plate.

**Poultry meat.** In the Poultry Meat PPPS (Standard 4.2.2), there is differentiation between poultry, poultry carcass, and poultry meat. Poultry is defined as chicken, turkey, duck, squab (pigeons), geese, pheasants, quail, guinea fowl, muttonbirds, and other avian species, except ratites (large flightless birds such as emu and ostrich). Poultry meat is defined as the parts of the poultry carcass intended for human consumption, thus by implication organs are included. Poultry carcass is defined as the whole dressed body of slaughtered poultry, but it excludes parts that have been removed from the dressed body, for example, the head, feathers, viscera (not defined in the standard), and blood.

**Meat and meat products.** In the Meat and Meat Products PPPS (Standard 4.2.3), meat product is defined as a food containing no less than 300 g/kg of meat. Meat is defined as any part of a slaughtered animal for human consumption, thus again by implication, offal are included. Animals included are bovine, caprine, ovine, porcine, bubaline, carmelidae, cervidae, crocodylidae, lagomorph, ratite, and soliped.

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**Table 1.** From the point of view of regulatory documents, health professionals, and consumers, the following is what is defined as “meat” and “not meat.”

| Products                  | Groups included for viewpoint |
|---------------------------|-------------------------------|
| FSANZ Food Code           | FSANZ PPPS                     | Health Professional | Consumer |
| Beef, pork, sheepmeat     | Meat                          | Meat                | Meat     |
| Offal from beef, sheep, pork | Not-meat                     | Meat*               | Meat, less so than beef |
| Other meat species        | Meat*                         | Not-meat            | Meat     |
| Poultry                  | Meat                          | Not meat            | Meat     |
| Seafood/fish              | Not meat                      | Not meat            | Meat, less so than beef |
| Veggie burger             | Not meat                      |                      |          |

*Meat is defined as any part of a slaughtered animal for human consumption, which includes organs (offal).

*Specified as including buffalo, camel, cattle, deer, goat, hare, pig, poultry, rabbit, or sheep, slaughtered other than in a wild state. Does not include avian, eggs, fish, or fetuses.

*Specified as including caprine, bubaline, carmelidae, cervidae, crocodylidae, lagomorph, ratite, and soliped, but only if not slaughtered in the wild.

*Specified as including chicken, turkey, duck, squab (pigeons), geese, pheasants, quail, guinea fowl, muttonbirds, and other avian species, except ratites.

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**Figure 1.** Qualitative multivariate analysis (QMA) map generated during the group discussion, capturing insights from 13 consumers. The QMA was designed to have no input or influence of a moderator. The red lines and writing show discovery of linkages between different and important values of products. The beef steak image was the first shown, and everything else was relative to the beef steak. A, Beef steak; B, Lamb chops; C, Pork chop; D, Chicken breast; E, Beef hamburger; F, Salmon steak; G, Trout; H, Crayfish; I, Heart; J, Kidneys; K, Liver; L, Pig trotters; M, Tripe; N, Cultured meat; O, Witchetty grubs; P, Grassshoppers; Q, Brains; R, Beetroot burger; S, Vegetable burger.
but only if not slaughtered in the wild. Ready-to-eat meat means meat products intended to be consumed without further heating or cooking including cooked or uncooked fermented meat, pate, dried or slow-cured meat, luncheon meat, or cooked muscle meat including ham and roast beef, and other ready-to-eat meat that is susceptible to the growth of pathogens or the production of toxins.

Seafood PPS. The Seafood PPS (Standard 4.2.1) makes no reference to meat, and it is clear that seafood is not considered as meat.

Consumers

Australia is a very diverse, multicultural society with more than 28% of the Australian population born overseas (Australian Bureau of Statistics, 2017). Australians on a per capita basis eat 130 g of meat per day 57 g of the 130 g are beef, lamb, or pork, the remainder being 46 g of poultry, 10 g of sausages, and 17 g of processed and fermented meat (ham, bacon, salami, etc.; Meat and Livestock Australia, 2015). Although Australians eat a very diverse set of international cuisines, these choices tend to be consumed at restaurants, and the more “traditional meat” choices tend to be consumed at home.

The key occasion and most familiar experience for everyday meat consumption in Australia is the barbecue. Dining at home often involves meat and typically is center of the plate, with a few vegetables on the side. The key elements that Australian consumers look for in meat are that it is tasty, Australian grown, fresh, and natural. Asia Pacific, as a region, has significant food safety issues whereas Australia and New Zealand have strong food safety controls and thus are recognized for food that is more than just “clean and green.”

To better understand how consumers perceive meat, we convened a group of 13 consumers, to qualitatively respond to a variety of meat stimuli from traditional options (steak, chops) to hamburgers, fish/seafood, offal (as defined in the regulatory section), and insects. The participants were asked to map these options from non-meat to meat on the x-axis and from unfamiliar to familiar on the y-axis to build a perceptual map. This method has previously been described by Drake et al. (2009). The participants’ individual and collective comments that determined where the stimuli mapped in relation to each other were noted. These comments allowed an understanding of their decision-making process in determining “what is meat” and “what is non-meat.” At the start of the session, a picture of a beef steak was shown, as the starting point, and all other foods were compared to this (see Figure 1 and Table 1). For most consumers, the unprompted initial response to what is “meat” was that it was “beef.” The consumers commented that when at a barbeque, they expect some beef to be served. Comments were made that “serving beef reflects the graciousness of the host,” as beef is still one of the more expensive types of meat. Chicken, pork, and lamb were perceived to be “other meat.” Pork and lamb were considered to be similar “meatiness” relative to beef, whereas chicken and beef burgers were considered slightly less “meaty” but tend to be eaten more often on a weekly basis as they are lower in cost. Fish and seafood were clearly different relative to beef; they were considered less “meaty” although interestingly were considered similar in meatiness to beef burgers. Insects and offal were not considered familiar foods and were considered even less “meaty,” and they were placed on the lower end of the line between meat and protein. Some vegetable-based protein offerings (vegetable and beetroot burgers) were more familiar than insects or offal, and the comment was that they were typically presented in a familiar format (burgers), but the opinion of consumers was that they were clearly not “meat.” Thus, plant-based protein burgers were considered “non-meat.” This idea of meat vs. protein is important as it creates a level of uncertainty about the food for consumers. To a consumer, meat is a clearly known food while protein requires more detailed product information before consumption. Lab-grown meat (cultured meat) is considered more “meaty” than insects, brains, or vegetable-based offerings; however, while it is meat, it remains very unfamiliar to consumers. As it was considered to contain no fat, it was rated more “meaty” than the foods perceived to be “fatty” (brains and witchetty grubs). It confused consumers, as they are not certain if it is fresh and natural, tasty, and/or Australian grown.

In terms of what the consumer group considered “meat” and non-meat, for fish/seafood and offal they were all considered less “meaty” than beef steak, to varying degrees, but were still considered meat. Offal with a “red” color (i.e., liver, kidneys, heart) was perceived as more “meaty” than offal/food with paler colors (i.e., tripe and brains). Veggie burgers (vegetable protein burgers), although familiar, were considered non-meat. Cultured meat was considered very “meaty” but quite repulsive.

The term “meaty” for most consumers was associated with red meat and included both skeletal and smooth muscle. The more fat that was perceived to be in the meat offering, the less “meaty” the consumers rated it. The texture of “meat” was expected to be tender and not overly chewy. In contrast, the participants commented that fish and seafood “can be too soft” while offal and insects shift away from this expected “meaty” texture to either too chewy or even crunchy.

Butcher shops in Australia usually sell beef, chicken, lamb, and increasingly kangaroo, offal, and sometimes fish. However, the shop selling seafood and fish might also be next to the butcher. In the supermarket, all beef, chicken, pork, sheepmeat, and kangaroo meat is sold in open display cabinets whereas fish/seafood is located in closed (non-accessible by customer) display cabinets in the delicatessen section, alongside processed meats such as ham and bacon. Hence, sometimes meat and fish/seafood are sold in the same retail stores and alongside each other whilst in other stores, there is a distinct separation both between and within the stores.

Health Professionals

In Australia, the National Health and Medical Research Council (NHMRC) is Australia’s leading expert body promoting the development and maintenance of public and individual health standards. It is responsible for both research funding and advice and draws on a wide range of resources from all components of the health system. Health professionals use these guidelines to provide advice to consumers. The NHMRC provides Australian Dietary Guidelines for healthy eating. In the latest guidelines, the recommendations in guideline 2 are for consumers to eat from five food groups, one group being the protein group which includes lean meats and poultry, fish, eggs, tofu, nuts/seeds, and legumes/beans (NHMRC, 2013). Guideline 3 specifies that, among other things, the intake of “processed meats and commercial burgers” should be limited (NHMRC, 2013).

The definition of meat is provided in evidence statements for all food where there are separate categories for meat, fish, and poultry (NHMRC, 2011). The definition of “fresh meat” is “red meat taken from the carcass of any cattle, sheep, goat, buffalo, kangaroo, camel, deer, pig, or rabbit and includes muscle component only” (Table 1). “It does not include offal, such as liver and kidney, nor processed red meat.” The reference to poultry includes a quote from the World Cancer Research Fund: “people who eat flesh foods are advised to prefer poultry and all types of fish, to
red meat.” This shows that red meat, as defined above, is defined as separate to poultry and fish. In the NHMRC (2013) report, processed meats are defined as “meat preserved by smoking, curing, salting, or addition of chemical preservatives such as nitrates.” The definition of “meat” in the context of “processed meat” is not provided.

Summary

To the consumer, flesh/tissue from all living animals is considered meat, and the “most meaty” to “least meaty” was beef/sheep/meat/pork > chicken > hamburger/salmon/trout > crayfish > heart > kidney/liver/pig trotter > tripe/cultured meat > witchetty grub/grasshopper/brains. Vegetable burgers were considered “not meat.” From the point of view of the health professional, only red meat is considered “meat,” and poultry, fish, and offal are considered “not meat.” To the regulator, fish is not described as meat whereas all poultry and red meat is considered “meat.” In the case of offal, the food standards code 2.1.1 class offal as non-meat, whereas the FSANZ PPS define offal as meat. It may be prudent for the FSANZ regulators to consider standardizing their descriptions of meat. Health professionals appear to be use different definitions for “meat” in comparison to both consumers and regulators. This is likely because they consider any food from a nutritional point of view.

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About the Authors

Robyn Warner presently works as Professor in Meat Science at the University of Melbourne, Australia, where she applies her meat science and muscle biochemistry training to problems confronting the meat industry, supervises post-graduate students, and teaches meat science. Professor Warner has published 89 papers in refereed journals, given invited lectures in countries around the globe, and serves as an editor for journals and encyclopedias. She was the winner of the 2014 American Meat Science Association International Lectureship Award and has also received national and international awards for her role on the Meat Standards Australia food grading scheme. Warner is most interested in conducting investigations of the biology, biochemistry, and biophysics of muscle through the chain, from animals to consumers. She also is very interested in how the muscle responds to innovative and emerging processing, packaging systems, and cooking to determine consumer acceptability and meat quality. Correspondence: robyn.warner@unimelb.edu.au

Evan Bittner is a Ph.D. candidate at the University in Melbourne (UOM). He has a diverse background in science, earning his bachelor degree with honors from UOM in 2008 before travelling overseas to work in conservation and study the behaviour of Asian elephants to deter crop-raiding and mitigate human–elephant conflict in Southeast Asia. He has a background in animal reproduction, nutrition, behavior, and husbandry. His Ph.D. work is investigating export opportunities for Australian pork into Asia, and he believes that his background in agriculture, animal science, and conservation give him a unique perspective and skills to approach his Ph.D. project.

Hollis Ashman has extensive global industry experience with a focus on creating compelling experiences through the application of critical thinking. Prior to starting Fusi8 (an opportunity development company), she joined the University of Melbourne as Enterprise Director and was previously at Mondelez ANZ as Innovation Best Practices Manager. Ashman has led and owned a boutique innovation company (MUSE) where she had multiple Fortune 500 clients and helped deliver many innovative new products and opportunities to the marketplace.

She has worked in the electronics industry for both Motorola and Vodafone (in both the US and Europe) with integrated circuits, hybrids, printed circuit boards, and LCDs; the metals industry for ALCOA creating new technology-based opportunities and joint ventures; the appliance industry for Whirlpool implementing a global strategy to move the company from electro-mechanical controls to electronics worldwide; and the foods industry for Nabisco, where as Vice-President of Strategy, she led the development of new platforms and opportunities. She has been an adjunct professor for The Ohio State University for 13 years, teaching in the food science school and the business school.