AUSTRALIAN Prawn Farmers ASSOCIATION

23rd October 2012.

Mr David Borthwick AO PSM
The Department Agriculture Fisheries Forestry

SUBMISSION – Review of Commonwealth fisheries management legislation.

Australian Prawn Farmers Association (APFA) was established in 1993 as a mechanism to support the developing and pioneering industry of prawn farming. Compared to other traditional terrestrial sectors and the fishing industry this farming method has only been in Australia for 26 years.

Currently prawn farms are operational in Northern NSW and in clusters along the Queensland coast at the Gold Coast, Bundaberg, Mackay, Ayr, Townsville and Cairns. All farms are reliant on estuaries for their intake water and are regionally based.

Since inception this industry has been very well supported by Australia's most respected research agencies such as Fisheries Research Development Corporation (FRDC), CSIRO Food Futures Group, Queensland Department Agriculture Fisheries and Forestry (QDAFF), Australian Institute Marine Science (AIMS), Department Agriculture Fisheries and Forestry (DAFF) to name a few.

Everything prawn farmers do has been underpinned by millions of dollars worth of research and has covered topics in relation to key environmental issues, domestication, genetics, disease resistance, water quality, sustainable feed, spatial analysis, seasonal forecasting, energy auditing, value adding and better feed conversion ratios.

Australia's prawn farmers are the only group within the seafood industry to have a compulsory levy for research and development. This levy combined with leveraged dollar support from FRDC and Seafood CRC continues to benefit the industry with research.

Despite all the research that has been done proving that our industry is sustainable, does not harm the environment and is a valuable contributor of quality secure food, the sustainable development of the industry is severely constrained by the complexity and inconsistency of policies and policy decisions.

The bulk of prawn farms are situated adjacent to the Great Barrier Reef and new developments have been stifled by current legislative processes of the EPBC Act and its use of the precautionary principle – even though nutrient discharge limits, for this particular establishment, would have been within the required limits of Queensland state government laws, science and complex Environment Regulatory Assessments (ERA) were ignored. Under the precautionary principle some impact meant that nothing could occur therefore zero net discharge limits were enforced on this development.

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Under the terms of reference for this review the APFA will respond to the following two sections in the context of prawn farming development approvals:

Recommend changes to the Acts that clearly establish the Fisheries Management Act 1991 as the lead document in fisheries management and that all aspects of environmental economic and social consideration and the relevant planning processes required to be incorporated into the Acts, in a co-ordinated way.

Recommend any necessary changes to the Acts that affirm the powers of a Minister to take advice, and make decisions, with the full scope of the Fisheries Management Act 1991 and the Environment Protection and Biodiversity Conservation Amendment 1999.

Prawn farms current and proposed new developments are at a disadvantage in comparison to other terrestrial based farming in as much as we have designated intake and discharge points. It is these discharge points that are required to be measured upstream and downstream to meet current environment legislative requirements and limits imposed. At times farms cannot do water exchange because of the turbidity of the estuary and all farms undertake as part of their licence conditions an annual mangrove survey ensuring that they are healthy and not disturbed. The mangroves grow prolifically at and in the vicinity of prawn farms a further indication that prawn farmers have little impact on the receiving environment.

The APFA understands that GBRMPA has in place an annual marine monitoring program which recognises that runoff from various sources, excessive rain events and urban development contribute to elevated nutrient and suspended sediment run off. Prawn farms have little to no effect in contributing to these loads, yet we are often responsible for cleaning up run off upstream of our intake areas. Clean healthy water is a critical element of growing prawns and we are not always in a position to have access to optimal water conditions because of the agriculture or mining sectors that surround existing farms. Even council mosquito spraying can have an adverse affect on prawn production if sprayed upstream from a farm as insecticides kill prawns. Everything that goes into catchments where prawn farms take their water can affect the whole grow out phase as prawns are very sensitive to all elements they are exposed to.

All water testing that is undertaken of a prawn farm shows no trace of sediment within 100 metres upstream or downstream from a discharge point. Prawn farming sediment usage and water quality has been the subject of over 45 peer reviewed research papers. Please see attachment A Peer reviewed Research Summary from CSIRO.

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The APFA notes that the GBRMPA has abrogated its regulatory responsibility back to the Federal government under the EPBC Act – see details below, who use the precautionary principle to stifle and restrict prawn farm development.

Evidence of this was the recent Guthalungra prawn farm development that was given conditional approval of "nil net discharge" even though the Queensland state government approvals were eventually granted and ERA's proved there would be very little impact into the receiving waters.

To meet the imposed "nil net discharge" this particular development is able to meet this condition if it purchases offsets – that is buy a neighbouring farm, restrict farm land use and plant trees. The only thing this does is tie up possible valuable agriculture land for no good reason other than to appease the green movement. The important thing to note here is the under load based licensing and existing water treatment technologies waste waters can mostly be returned to the environment cleaner than the incoming water, so why do precautionary principles apply to an industry that has demonstrated sound environmental practice over 25 years should be subjected to 13 years of bureaucratic red-tape for new approvals in a economic climate of needing new industry growth is beyond us.

APFA have seen modelling of effects to the reef with increased shipping activity particularly relevant to the mining sector. The huge numbers predicted carry a far greater danger to the reef and prawn farms alike with what they can bring with them in the ballast water.

The precautionary principle that has been applied so stringently to one small prawn farm development approval does not seem to have been applied to increased shipping nor increased mining along the marine protected coastline.

Why not?

The APFA believes the answer lies with Australia's free trade policies. Attached please find a page taken from the National Food Plan green paper (refer Attachment B) – showing Australia currently imports 75% of our seafood, making it the sacrificial lamb to export our other agriculture products traded off against seafood.

Australia's green policy trend of locking up our waters under the guise of marine parks and reluctance to advance and embrace aquaculture development simply is very irresponsible and simply means that Australia is prepared for international environments to be impacted so that we can access and import seafood.

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http://www.gbrmpa.gov.au/__data/assets/pdf_file/0016/4552/gbrmpa_AnnualRegulatoryPlan_29062012.pdf

Extracted from above link:

Revocation of the *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000*

Description of issue

It is proposed that the *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* be repealed to rectify inconsistencies with current Queensland legislation. The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBCA) currently provides the GBRMPA with adequate protection with respect to aquaculture and the *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* are no longer necessary.

Consultation opportunities

As these amendments are intended to simply rectify inconsistencies with Queensland legislation by removing provisions which are now adequately dealt with under the EPBCA,
they will not alter current management intent and are unlikely to have significant impacts on business or the not for profit sector. Therefore, the GBRMPA does not propose to conduct stakeholder consultation.

Expected timetable

It is anticipated the amendments will take effect in December 2012.

Date last modified

This entry was made on 29 June 2012.

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Recommendations:

Harmonisation between state and Federal government NRM and EPA agencies, in relation to allowable discharge limits, particularly for prawn farm developments would hopefully make development approval process more transparent rather that the use of the precautionary principle which does not seem to get applied to the mining sector.

Current water testing that prawn farms comply with does not take into account effects in the waterways of neighbouring land and its various other uses.

Government agencies who make decisions ignore existing peer reviewed science in favour of skewed outdated opinions. Refer Attachment A Peer Reviewed Research.

Aquaculture prawn farming in Australia needs to be considered as a valuable, sustainable and viable secure protein source for Australians and possibility for export if growth and expansion is allowed. At present this industry is trade exposed, there needs to be a distinct recognition of free trade versus fair trade.

Australia needs to have a policy on designated aquaculture areas for future developments so as to avoid lengthy and costly delays of government departments when any development is proposed. The APFA notes and will follow with interest how easily a WA 10,000 hectare aquaculture Chinese investment facility will get through the regulatory frameworks. APFA will be measuring the timeframes of this facility a foreign investment compared to the Guthalungra Australian investment. It will be interesting to see if the Australian facility will be discriminated against in favour of the foreign dollar!!!!

Helen Jenkins
Executive Officer
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References:

Australian Government Department of the Environment, Water, Heritage and the Arts approval notice. Guthalungra aquaculture facility, north Bowen, Queensland (EPBC 2001/138) February 2010.

Commonwealth of Australia Proof Committee Hansard, House of Representatives standing committee on agriculture, resources, fisheries and forestry. Role of science for the future of fisheries and aquaculture. Tuesday, 31 July 2012. Townsville. Comments by Alistair Dick.

Glen De'ath, Katharina E Fabricius, Hugh Sweatman and Marju Puotinen, The 27-year decline of coral cover on the Great Barrier Reef and its causes. PHAS Early Edition.

Great Barrier Reef Marine Park Authority Annual Regulatory Plan 2012/13.

Great Barrier Reef Marine Park Authority Annual Marine Monitoring Report. Reporting on data available from December 2004 to April 2006.

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The environmental management of prawn farming in Queensland – worlds best practice

Research Summary

The environmental management of prawn farming in Queensland – worlds best practice

The emergence of prawn farming as an economically successful industry in coastal regions of Queensland over the past two decades prompted a comprehensive, multi-disciplinary study of intensive prawn pond ecosystems, their ecological impacts on downstream environments and the development of cost-effective effluent treatment systems.

The seven year study (1995-2002) focussed on the largest prawn farms in Queensland and New South Wales throughout the production cycle for several successive years. The study encompassed a range of latitudes, discharge environments (e.g. tidal creeks and estuaries) and both flow through and recirculating water management systems.

The study integrated the research skills of 30 scientists from several institutions including CSIRO, Australian Institute of Marine Science, University of Queensland, Queensland Department of Environment and Heritage, New South Wales Environment Protection Authority, Griffith University, University of Sydney, University of Technology, Marine and Freshwater Resources Institute, Victoria and the University of Maryland, U.S.A.

The multidisciplinary study was the most comprehensive analysis of the environmental management of prawn farming ever conducted. The team developed rigorous techniques for sampling eutrophic pond ecosystems including sediment and water column nutrients and microorganisms, pond biota and abiotic variables. The application of enriched isotope nutrient labeling techniques, pioneered by the team, permitted the first accurate quantification

of the fate of feed nutrients in an intensive prawn farming system and downstream from the farm. The integrated approach adopted throughout the study also permitted the team to produce a multi-author synthesis of the dominant ecological processes in intensive shrimp ponds and adjacent coastal environments. Beyond developing a quantitative understanding of these processes the team analysed pond effluent composition and designed a cost-effective effluent treatment system based on sedimentation processes. The introduction of settlement ponds has also provided industry the opportunity to recapture water nutrients using natural biological filters.

The results of the project have been communicated via 42 refereed scientific publications and four final reports (see references).

The key elements of the study were:

- prawn pond sediment and nutrient processes (*references* 1-22)
- composition of prawn pond discharges (23)
- discharge treatment systems and environmental management (23-29)
- receiving waters - assimilation and monitoring (30-40)
- synthesis of pond processes and environmental management (41-45)
- aquaculture land use planning (46).

The key outputs of these studies were:

- Prawn pond sediment and nutrient processes rigorously quantified and modelled (1, 18)
- Pond discharge composition rigorously quantified (22, 23)
- Published the first synthesis of the dominant ecological processes in ponds and adjacent costal environments (30)
- In collaboration with industry, designed and implemented cost-effective treatment system based on sedimentation processes (24, 25, 27).

Outcomes and implications:

- All Australian prawn farms use environmental management practices, including discharge treatment systems, which enable them to meet world best practice discharge water quality.
- Progressive advances in treatment systems and practices have enabled some farms to increase their total production area with no net increase in sediment and nutrient loads discharged into receiving waters.
- Increasing production area without increasing sediment and nutrient outputs has been achieved by increasing the area of treatment ponds (in some cases up to 35% of the total pond area). There is a major opportunity to develop the next generation of discharge treatment technology to reduce the required area of treatment ponds.
- The prawn farming industry has achieved an effective balance between economic gains and conserving ecosystems, including the world heritage listed Great Barrier Reef.
- With these operating practices and regulations in place, there is significant opportunity for the industry to expand without compromising the economic and environmental sustainability of the industry.
- Broad scale desktop analysis identified 594,000 hectares of potentially optimal pond aquaculture land along the Queensland coast that would not compromise the environmental standards for the region (46).
- A fine scale land use modelling case study that enabled the expansion of an existing prawn farm adjacent to the Logan River, optimising the economic benefits of land use in the regions with no increase in nutrient or sediment discharges to the Logan River (commercial in confidence).
- For example an increase from the current 717 hectares of prawn ponds, producing 2,940 tonnes valued at $40 million to 5,000 hectares of ponds producing 30,000 tonnes valued at $400 million - would correspond to less than 1.4% of the existing sugar cane production area. The 5,000 hectares could be located within any of the 594,000 hectares of potentially suitable land between the border of New South Wales and Northern Territory border (a total distance of 13,347 km).

Scientific publications and reports - Prawn pond nutrient process, downstream impacts and environmental management options

In ponds

1. Burford M.A., Lorenzen K., 2004, Modeling nitrogen dynamics in intensive shrimp ponds: the role of sediment remineralization, Aquaculture 229, 129–145
2. Burford M.A., Thompson P.J., McIntosh R.P., Bauman R.H., Pearson D.C., 2004, The contribution of flocculated material to shrimp (*Litopenaeus vannamei*) nutrition in a high-intensity, zero-exchange system, Aquaculture 232, 525–537
3. Burford, M. A. and Glibert, P. M., 1999. Short-term nitrogen uptake and regeneration in early and late growth phase shrimp ponds. Aquaculture Research 30, 215-227.
4. Burford, M. A. and Longmore, A.R., 2001. High ammonium production from sediments in hypereutrophic shrimp ponds. Marine Ecology Progress Series 224, 187-195.
5. Burford, M. A. and Williams, K. C., 2001. The fate of nitrogenous waste from shrimp feeding. Aquaculture 198, 79-93
6. Burford, M. A., 1997. Phytoplankton dynamics in shrimp ponds. Aquaculture Research 28, 351-3
7. Burford, M. A., 2001. Fate and transformation of dietary nitrogen in penaeid prawn aquaculture ponds. PhD Thesis, University of Queensland, Australia, 162 pp.
8. Burford, M. A., Peterson, E. L., Baiano, J. C. F. and Preston, N. P., 1998. Bacteria in shrimp pond sediments: their role in mineralizing nutrients and some suggested sampling strategies. Aquaculture Research 29, 843-849.
9. Burford, M. and Pearson, D.C., 1998. Effect of different nitrogen sources on phytoplankton composition in aquaculture ponds. Aquatic Microbial Ecology 15: 277-284.
10. Burford, M.A., Preston, N.P., Glibert, P.M., Dennison, W.C., 2002. Tracing the fate of 15N-enriched feed in an intensive shrimp system. Aquaculture 206, 199–216.
11. Burford, M.A., Sellars, M.J., Arnold, S.J., Keys, S.J., Crocos, P.J, Preston, N.P., 2004. Contribution of the natural biota associated with substrates to the nutritional requirements of the post-larval shrimp, *Penaeus esculentus* (Haswell), in high-density rearing systems. Aquaculture Research 35: 508-515.
12. Burford, M.A., Thompson, P.J., McIntosh, R.P., Bauman, R.H., Pearson, D.C., 2003. Nutrient and microbial dynamics in high-intensity, zero-exchange shrimp ponds in Belize. Aquaculture 219, 393–411.
13. Coman, F.E., Connolly, R.M., Bunn S.E., Preston, N.P., 2006. Food sources of the sergestid crustacean, *Acetes sibogae*, in shrimp ponds. Aquaculture 259: 222–233.
14. Coman, F.E., Connolly, R.M., Preston N.P., 2006. Effects of water exchange and abiotic factors on zooplankton and epibenthic fauna in shrimp ponds. Aquaculture Research 37: 1387-1399.
15. Gao, J. and Merrick, N.P., 1996. Simulation of temperature and salinity in a fully mixed pond. Environmental Software, 11(1-3): I73-8.
16. Jackson, C.J. and Wang, Y.G., 1998. Modelling growth rate of *Penaeus monodon* Fabricius in intensively managed ponds: effects of temperature, pond age and stocking density. Aquaculture Research 29: 27-36.
17. Peterson, E.L., 2000. Observations of pond hydrodynamics. Aquacultural Engineering 21: 247-269.
18. Peterson, E.L., Harris, J.A. and Wadhwa, L.C., 2000. CFD modelling pond dynamic processes. Aquacultural Engineering 23: 61-93.
19. Peterson, E.L., Wadhwa, L.C. and Harris, J.A., 2001. Arrangement of aerators in an intensive prawn growout pond having a rectangular shape. Aquacultural Engineering, 25: 51-65.

20. Preston N.P., Smith D.M., Kellaway D.M., Bunn S.E., 1996, The use of enriched 15N as an indicator of the assimilation of individual protein sources from compound diets for juvenile *Penaeus monodon*, Aquaculture 147, 249-259
21. Preston, N.P., Coman F.E. and Fry V.M., 2003. Shrimp pond zooplankton dynamics and the efficiency of sampling effort. Aquaculture Research 34 (5) :373-381

Pond discharge composition

22. Jackson C., Preston N., Thompson P.J., 2004, Intake and discharge nutrient loads at three intensive shrimp farms, Aquaculture Research, Volume 35, Issue 11, September, 1053-1061
23. Jackson, C.J., Preston, N.P., Burford, M.A. & Thompson, P., 2003. Nitrogen budget and effluent nitrogen characteristics of an intensive shrimp farm. Aquaculture 218: 397-411.

Treatment and environment management

24. Burford. M. A., Jackson, C. J. and Preston, N. P., 2001. Reducing nitrogen waste from shrimp farming: an integrated approach. In: The New Wave, Proceedings of the Special Session on Sustainable Shrimp Culture, Aquaculture 2001. eds. C. L. Browdy and D. E. Jory, pp. 35-43. The World Aquaculture Society, Baton Rouge, USA.
25. Jackson, C.J., Preston, N.P., Burford, M.A. & Thompson, P., 2003. Managing the development of sustainable shrimp farming in Australia: the role of sedimentation ponds in treatment of farm discharge water. Aquaculture 226: 23-34.
26. Jones, A. B. Preston, N. P., 1999. Oyster filtration of shrimp farm effluent, the effects on water quality. Aquaculture Research 30, 51-57.
27. Jones, A.B., Dennison, W.C. and Preston, N.P., 2001. Integrated treatment of shrimp effluent by sedimentation, oyster filtration and macroalgal absorption: a laboratory scale study. Aquaculture, 193: 155-178.
28. Ngo, H.H. and Vigneswaran, S., 1995. Application of floating medium filter in water and wastewater treatment with contact-flocculation filtration arrangement. Journal of Water Research – IAWQ, 29:9: 2211-2213.
29. Ngo, H.H. and Vigneswaran, S., 1996. Application of downflow floating medium flocculator/prefilter (DFF) –coarse sand filters in nutrient removal. Journal of Water Science and Technology, 33:8: 63-70.

Receiving waters – assimilation and monitoring

30. Burford M.A., Costanzo S.D., Dennison W.C., Jackson C.J., Jones A.B., McKinnon A.D., Preston N.P., Trott L.A., 2003, A synthesis of dominant ecological processes in intensive shrimp ponds and adjacent coastal environments in NE Australia, Marine Pollution Bulletin 46, 1456–1469
31. Costanzo S.D., O'Donohue M.J., Dennison W.C., 2004, Assessing the influence and distribution of shrimp pond effluent in a tidal mangrove creek in north-east Australia, Marine Pollution Bulletin 48, 514–525
32. Costanzo, S. D., 2001.Development of indicators for assessing and monitoring nutrient influences in coastal waters. PhD Thesis, University of Queensland, Australia.
33. Jones, A. B., O'Donohue, M. J., Udy, J. and Dennison, W. C., 2001. Assessing ecological impacts of shrimp and sewage effluent: biological indicators with standard water quality analyses. Estuarine, Coastal and Shelf Science 52, 91-109.
34. McKinnon, A. D. and Klumpp, D. W., 1998. Mangrove zooplankton of North Queenland, Australia I. Plankton community structure and environment. Hydrobiologia 362, 127-143.

35. McKinnon, A. D., Trott, L. A., Alongi, D. M. and Davidson, A., 2002. Water column production and nutrient characteristics in mangrove creeks receiving shrimp farm effluent. Aquaculture Research 33: 55-73
36. McKinnon, A. D., Trott, L. A., Cappo, M., Miller, D. K., Speare, P and Davidson, A., 2002. The trophic fate of shrimp farm effluent in mangrove creeks of North Queensland, Australia. Estuarine, Coastal and Shelf Science 55, 655-671
37. Trott A., McKinnon A.D., Alongi D.M., Davidson A., Burford M.A., 2004, Carbon and nitrogen processes in a mangrove creek receiving shrimp farm effluent, Estuarine, Coastal and Shelf Science 59,197e207
38. Trott L.A. and Alongi, D.M., 2000. The impact of prawn pond effluent on water quality and phytoplankton biomass in a tropical mangrove estuary. Marine Pollution Bulletin 40:947-951
39. Trott, L.A. and Alongi, D.M., 1999. Variability in surface water chemistry and phytoplankton biomass in two tropical, tidally-dominated mangrove waterways. Marine and Freshwater Research. 50:451-7
40. Wolanski, E., Spagnol S., Thomas, S., Moore, K., Alongi, D.M., Trott, L.A. and Davidson, A., 2000. Modelling and visualizing the fate of prawn pond effluent in a mangrove-fringed tidal creek. Estuarine, Coastal and Shelf Science, 50:85-97

Synthesis documents

41. Preston, N, Macleod, I, Rothlisberg, P, Long, B, 1997, Environmentally sustainable aquaculture production - An Australian perspective. In: Developing and sustaining world fisheries resources. The state of science and management. pp. 471-477.
42. Preston, N. P., Rothlisberg, P. C., Burford, M. A. and Jackson, C. J., 2001. The Environmental Management of Shrimp Farming in Australia. Report prepared under the World Bank, NACA, WWF and FAO Consortium Program on Shrimp Farming and the Environment. Work in Progress for Public Discussion. Network of Aquaculture Centres in Asia-Pacific (NACA) Bangkok, Thailand, 9pp.
43. Preston, N.P. et al 2003. Pond and effluent management (Aquaculture CRC Ltd Project E187).
44. Preston, N.P., Jackson, C.J., Thompson, P.J., Austin, M. and Burford, M.A., 2000. Prawn farm effluent: origin, composition and treatment. FRDC 95/162 Final Report, Fishing Industry Research and Development Corporation, Canberra, Australia.
45. Trott L.A. and Alongi D.M., 2001. Quantifying and predicting the impact of prawn effluent on the assimilative capacity of coastal waterways (FRDC Project 97/212) and

Land-based mapping

46. McLeod, I., Pantus, F. & Preston, N.P. (2002) The use of a geographical information system for land-based aquaculture planning. Aquaculture Research 33: 1-10.

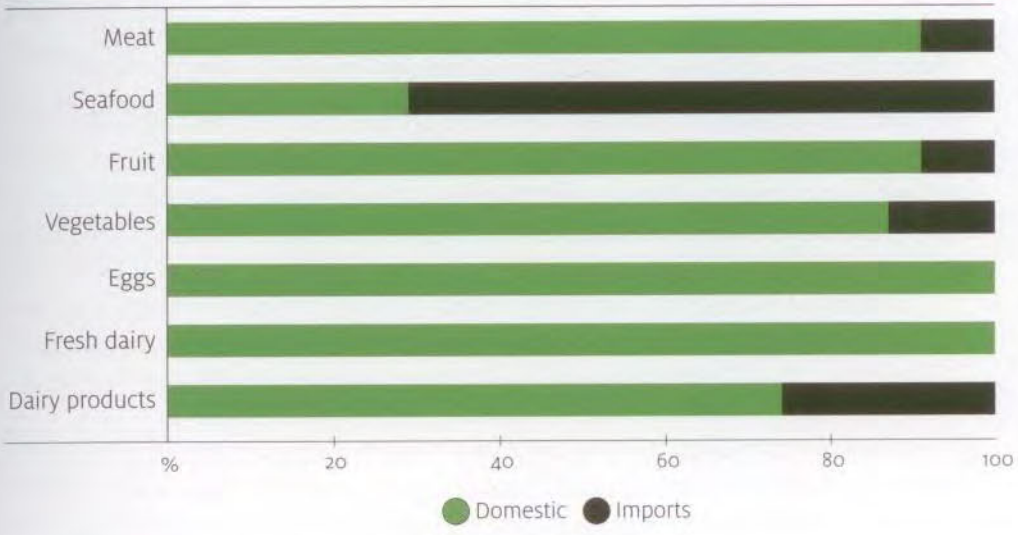
Australia has a long history of producing more food with fewer resources and past decades have seen strong growth in Australian agricultural productivity relative to other sectors of the Australian economy. While productivity is still growing, the rate of growth has slowed in agriculture, manufacturing and the economy more broadly. However, Australia is still producing a vast surplus of food for its population, and therefore this slowing trend is not likely to affect the nation's level of food security for many years to come. Chapter 6 contains a detailed discussion on productivity growth in agriculture and food manufacturing.

Agricultural producers, food manufacturers and retailers operate in an increasingly global market. Food imports complement Australia's strong domestic food supply to meet consumer demand for competitively priced alternative products and to provide access to certain types of food not produced locally in sufficient quantities or which may be out-of-season. Imports are also important for Australia's food processing sector. Most Australian-produced packaged foods contain imported ingredients or use imported materials for packaging. These additives include: colourings, flavours and emulsifiers; yeast for baking; and long-life packaging and tinplate (DAFF 2009).

A profile of the relative self-sufficiency and stability of the Australian food supply is contained in *FOODmap: An analysis of the Australian food supply chain* (Spencer & Kneebone 2012). FOODmap was commissioned by the Department of Agriculture, Fisheries and Forestry (DAFF) and prepared by food industry specialists, Freshlogic. While the Australian Government does not advocate self-sufficiency as a specific policy objective, for most food categories we have high self-sufficiency of domestic food supply and a stable source of supply for market requirements (Figure 4.3).

If, for some reason, there was an inadequate supply of a particular type of food or food group in Australia, this would result in increased prices creating an incentive for producers to supply more.

FIGURE 4.3 Sources of fresh and processed food consumed in Australia



Source: Based on Freshlogic analysis of value chain volumes, Spencer & Kneebone 2012