

The Samoan Beef Industry

Country report for ACIAR Project LS/2018/102

Research opportunities for smallholder beef cattle systems in Pacific island countries

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Acronyms

ACIAR – Australian Centre for International Agricultural Research

APHD – Animal Production and Health Division, Government of Samoa

FAOStat – Food and Agriculture Organization of the United Nations, Food and agriculture data

GDP -Gross Domestic Product

GoS – Government of Samoa

HRI - Hotel, restaurant and institution

HIES – Household Income and Expenditure Survey

MAF - Ministry of Agriculture and Fisheries, Government of Samoa

MCIL - Ministry of Commerce, Industry and Labour, Government of Samoa

MSU – Mobile slaughter unit

PHC - Population and Housing Census

SACEP - World Bank Samoa Agriculture Competitiveness Enhancement Project

SAFPROM - Samoa Agriculture Productivity and Marketing Project

SBEC – Small Business Enterprise Centre, Government of Samoa

SBS – Samoa Bureau of Statistics

SMS – Samoa Meat Supplies

WST – West Samoan Tala

1 Underlying structures

1.1 Economic

Samoa had a GDP of US\$756 million in 2017 (constant US\$ 2010). GDP growth fluctuated over the 10 years from 2008 to 2017 to average 1%. Tourism and remittances accounted for roughly 25% of GDP each. Value-added by agriculture, forestry, and fisheries declined over the period, yet still accounted for a large 11% of GDP (World Bank, 2018). The economy has a narrow manufacturing base, mainly related to the processing of agricultural products. Similarly, agricultural exports are dominated by agricultural products (fish, coconuts, and taro).

These economic structures influence Samoa's over-arching strategic document the *Strategy for the Development of Samoa, 2012-16* (MoF, 2016). The most relevant priorities for this report are "re-invigorating agriculture" and "revitalising exports".

With specific reference to the livestock sector, the value of domestically produced meat in 2012-13 was WST18 million (US\$7.7 million at 2013 exchange rates) and WST11 million for beef (US\$4.7 million) (APHD, 2014). Samoa imported 87% of all meat for consumption in 2012-13, mainly consisting of lower priced chicken meat from the United States. Samoa ran a trade deficit of US\$27 million in meat in 2017 (UNComtrade, 2018).

According to UNComtrade database statistics, Samoa has imported around 1,000 to 1,500 tonnes of (mainly fresh/chilled) beef per year from 2010-17, with a value of US\$3.8 million in 2017 (see Table 2). Based on estimates from the Animal Production and Health Division, Samoa (APHD), this is about half the amount of beef that is produced domestically (See MAF (2014) and Sections 3.1 and 3.3.8).

The beef industry is seen as having potential for development of the production, processing, service and trade sectors, which forms the industry policy and development outlined in Section 2.

1.2 Demographics

Samoa had a population of 196,000 in 2017. As a proxy for incomes, GDP per capita in 2017 was US\$3,851 (2010 constant). With 81% of the population rural (World Bank, 2018), most Samoan households are engaged in agriculture, but often as a secondary source of income.

Almost all rural Samoan households raise livestock. According to the 2016 Population and Housing Census, of the 28,800 rural households in Samoa, 50% raise pigs and 50% raise chickens (mainly low productivity, backyard systems). About 20% of households raise cattle, with proportions up to 50% in some parts of Savaii (SBS, 2017). However according to a dedicated cattle census conducted in 2012 (MAF, 2013), Samoa has a significantly lower number of cattle holdings than reported in the SBS (2017). It reports a total of 2,903 cattle holdings of which 1,245 were in Upolu and 1,658 were in Savaii.

1.3 Land use

Of the 2,830 square kilometres of land area in Samoa, about 12% is used for agriculture and 3% is arable (World Bank, 2018). The vast majority of the population live on the coast, but many have access to land that extends to inland mountain areas (Figure 3). About 30% of households live on the land they use for agriculture, 27% live off the agricultural land and 36% do not have access to agricultural land (SBS, 2017). With around 20% of the total land area used for livestock, land parcels are relatively large (average of 13 acres) although there can be significant regional differences (2015 Agricultural Survey; SBS 2016).

Of all operated land, 40% is planted permanently with crops such as fruits, coconuts and cocoa. Under colonial planning, the west and dry side of Savaii, was planted to coconuts. According to the 2016 population census, 21,242 households grew coconuts, covering 74,000 acres of land (SBS, 2017). Within the region, copra with a grass undergrowth can be grazed with cattle, and several agencies are interested in expanding cattle production under coconuts. However, many plantations are ageing and have suffered cyclone damage in recent years. A replanting program is planned which will require a period of 4-5 years of cattle enclosure.

In addition, 37% of operated land is planted to temporary (annual) crops such as vegetables and taro, especially in the cooler inland areas where cattle were traditionally raised. There is substitution between the two activities, as cattle and other livestock should be excluded from taro plantings. Taro planting also declined in the early 1990s due to taro leaf blight, which resulted in land being freed up for cattle. Due to a new hybrid variety and high international prices, taro planting has expanded rapidly in recent years in existing vegetable land, under copra, and into reclaimed bush.

Due to the population, topography and administrative patterns in Samoa, there is said to be large amounts of unused bush land that could potentially be used for cattle, although large capital and labour resources are required to utilise this land. It should also be recognised that 81% of land in Samoa is customary tenure (Taule'alo, Fong and Stefano, 2003), however a knowledgeable local sociologist does not consider this a constraint to development or provide disincentives for investment (Dr Sonny Lameta, 2018, pers. comm.).

Rainfall in Upolu and Savaii is characterised by wetter regions to the south-east and drier regions in the north-west, the result of prevailing south-easterly trade winds. Soils depth in Upolu varies with areas of deep clay, particularly in eastern Upolu, however, high rainfall, soil structure, and steep slopes promote leaching of soil nutrients with potassium and phosphorus being the most limiting nutrients. Water stress, particularly in the dryer areas, can also be severe due to lower water storage capacity of soils. Land in Savaii is rocky, on old lava flows, and drier, and this will need to be accounted for in forage selection.

Average annual precipitation in Apia is 2,800 mm, with rainfall highest in the southeast and lowest in the northwest. On average, 75% of rainfall is received in the wet season from November to April (350 mm per month) and declines to 150 mm in the dry season (ABS and CSIRO, 2011).

1.4 Cattle statistics

Samoa collects statistics on cattle through several channels. The first is through the Population and Housing Census (PHC) by the Samoa Bureau of Statistics (SBS) run in 2001, 2006, 2011 and 2016. An Agricultural Census (SBS and MAF) are undertaken approximately every five years (e.g. 1999, 2009, 2015 and the next in 2019). The PHC and the Agricultural Census report different results based on different survey and reporting methods. The Agricultural Census of 2015 reported a cattle herd of 56,000 head although it is widely acknowledged that statistical errors arise from collection methods (recall) and extrapolation. To indicate the magnitude of discrepancy, a dedicated cattle census (MAF, 2013) reported a cattle herd of 30,000 head in 2012 (also recorded in FAOSTat for 2014). This makes Samoa a relatively small cattle producer compared to Fiji and Vanuatu, but larger than Tonga or the Solomon Islands. Details of the production sector are provided in Section 3.3.

2 Policy, development and research initiatives

2.1 Government policy

2.1.1 Agricultural policy

The Samoan *Agriculture Sector Plan – 2016-2020* (MAF, 2015) outlines broad expected outcomes for agriculture in the country. This includes “an increased supply and consumption of competitively priced, domestically produced food” and “a sustained increase in production, productivity, product quality, value adding, and marketing of agriculture and fisheries”. This is to be achieved through partnering with the private sector, improving supply chains, quality assurance and certification, access to finance, and delivering extension services to small-holders and are discussed in the plan.

Only fisheries had a dedicated sub-sector plan. A livestock sector development plan was in place until 2004, but not since, and it was not disaggregated at the industry level. However, higher level plans guide lower level strategies and policies in the beef sector, including import substitution (to reduce imports to 10-30% of consumption) and to promote exports (potentially to American Samoa).

2.1.2 *The Slaughter and Supply Meat Act, 2015 Samoa*

An aspect of the broader strategy to develop the livestock sector is the *Slaughter and Supply Meat Act, 2015 Samoa* (SSM Act), which was passed by Parliament in 2015 and is due to be implemented in March 2019. More broadly, in relation to food safety, there is also a Food Act under the Ministry of Health. The vast majority of domestic cattle are killed through “bush kill” without regulation or inspection. The SSM Act requires that beef (not other meats) must be certified to enter the retail market, through ante-mortem and post-mortem inspection by Ministry of Agriculture and Fisheries (MAF) inspectors and effectively encourages slaughter in slaughter plants, either mobile or static. The Act aims to improve hygiene and sanitation of domestic beef that enters the retail market such as butcher shops and supermarkets. This is expected to increase confidence in domestic beef by consumers, restaurants and institutions and thus make domestic more competitive with imported beef).

2.1.3 Policy toward fa’alavelave

There is widespread concern in Samoa about the size and increased consumption of beef for ceremonies (fa’alavelave) for several reasons (see Figure 1 and Section 3.5.2). Firstly, beef that enters the fa’alavelave market diverts supply from the retail market, which is filled by imports, and inhibits the development of the sector. Second, there is also concern about the sustainability of the Samoan beef cattle herd due to low productivity, high turnoff and the culling of cows and breeding stock (Farm Consultancy Services, 2015). The fa’alavelave market is thought to contribute to this. Third, powerful fa’alavelave obligations can be a financial drain on families.

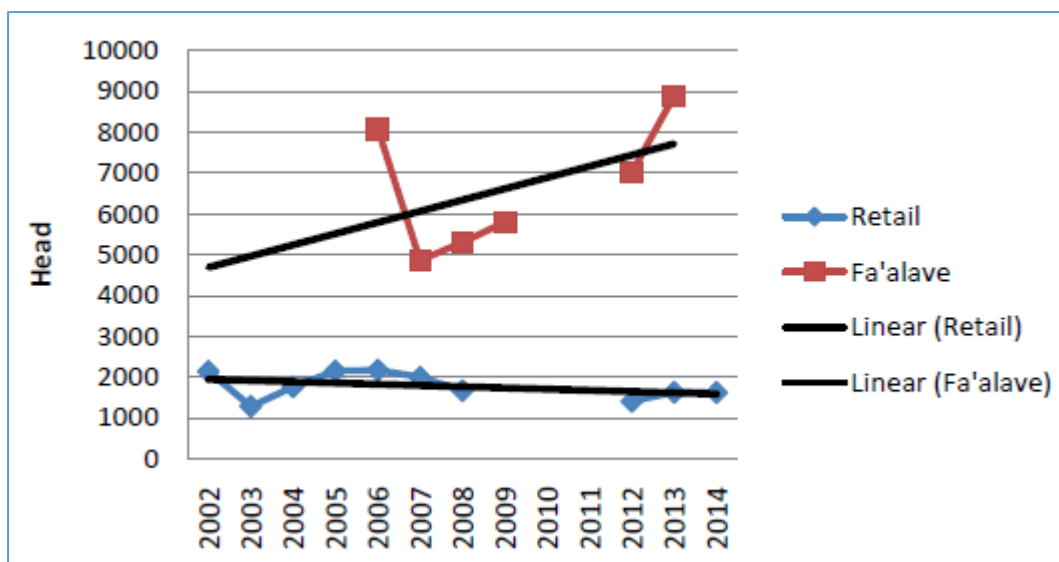


Figure 1: The destination of domestically slaughtered cattle – fa'alavelave vs retail

Source: Farm Consultancy Services (2015) based on APHD data

Consideration was given to applying The Act specifically to cattle slaughtered for the ceremonial (fa'alavelave) market, which was found to be unpopular and infeasible during consultation. However, The Act does aim to stop beef presented at fa'alavelave being on-sold to retailers and therefore limiting the consumption of cattle at fa'alavelave indirectly, rather than placing a limit on the number of cattle that could be killed for fa'alavelave, which was also unpopular and infeasible. This is discussed further in Section 3.5.2.

2.2 Agencies

Key government agencies and roles relevant to the beef industry are:

- Ministry of Agriculture and Fisheries (MAF) - divisions include: corporate services; policy, planning and communications; crops; livestock; fisheries; and quarantine;
- Animal Production and Health Division (APHD) – APHD is the key agency in the beef sector and comprises of the divisions of: research, extension, animal health and government farms. Importantly, APHD have jurisdiction over the slaughter and inspection sectors;
- Ministry of Commerce, Industry and Labour (MCIL) - has jurisdiction over the retail sector. Development of butchers and links with hotel, restaurant and institution (HRI) trade; and
- There is a national level Livestock Association and some village level associations. Crops Associations are also active in most villages.

2.3 World Bank project

In line with broader government policy, the World Bank Samoa Agriculture Competitiveness Enhancement Project (SACEP) is designed to improve the production and marketing of a range of agricultural products, including beef. The project focuses on the domestic market and to substitute imports. Exports are currently not a focus but opportunities will be explored if they arise, for example export of bananas to New Zealand and beef to American Samoa and Tokelau.

The project started in 2012, with an investment of US\$16m. Components include productivity and marketing, institutional strengthening, and grants to develop semi-commercial farmers. For cattle, the main activities are:

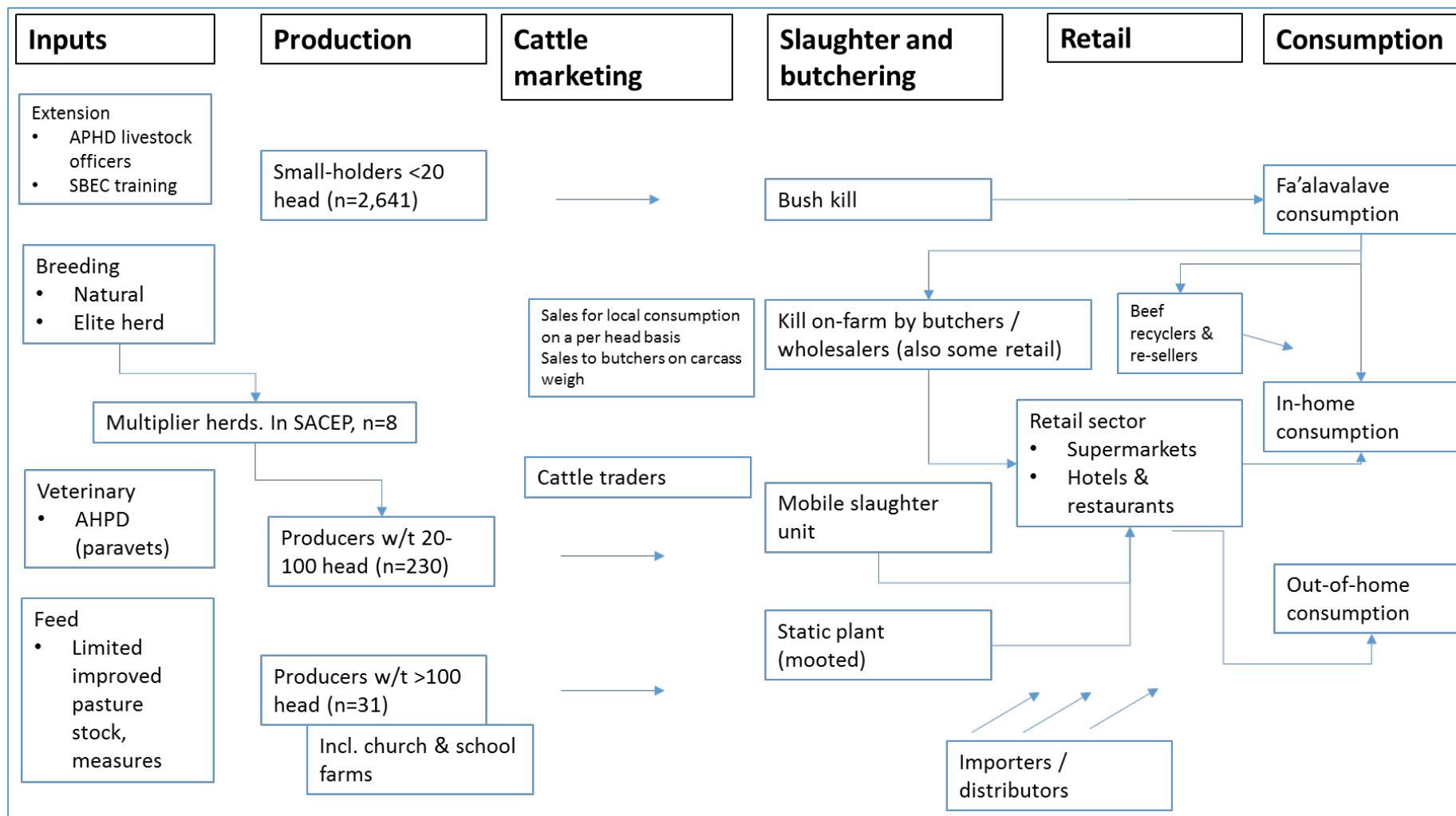
- Breeding. To import breeding stock (Droughtmasters, Dorpa and Fiji Fantastic sheep) to develop the elite breeding herd on the government farm (Togitogigia);
- Develop “multiplier farms”. This is a channel to disseminate breeding stock, and also to commercialise cattle farms. This includes support for breeding stock, infrastructure, training, and access to finance;
- To develop a mobile slaughter unit (MSU); and
- Development of the beef retail sector.

The SACEP is due to finish in December 2018 and design is underway for a Phase 2 successor project, the Samoa Agriculture Productivity and Marketing Project (SAFPROM). Amongst the measures considered for this project is the establishment and construction of a static abattoir in Apia.

3 Industry structures

3.1 Industry map

Box 1 provides a simple overview of structures and actors in the Samoan beef industry and will be used to guide subsequent discussion.



Box 1: Structures and actors of the Samoan beef industry

3.2 Inputs

3.2.1 Extension and training

The APHD provide extension services to farmers on production practices, such as castration, dehorning, pasture management and fencing. The Division have also developed training material such as leaflets. Farmers may also request vegetative stocks from APHD.

Extension and training services are a component of SACEP, although this is confined mainly to larger, multiplier farms. Livestock officers were sent to New Zealand for training. To be eligible for support under SACEP, multiplier farms must develop a business plan. The Small Business Enterprise Centre (SBEC) run business training in livestock, crops, and fisheries. MAF and APHD also provide technical advice. However, there is some concern that these activities won't continue after the World Bank projects conclude.

In general, it is more likely that farmer groups in villages receive training up to two to three times per year.

3.2.2 Finance

Finance is an important factor input in the development of the industry – including infrastructure, especially fencing and pasture improvement. Finance for farmers is notionally available through a range of channels (savings, remittances, or relatives) and through formal loans. However commercial banks rarely loan to small-holders.

Farmers that participate in SACEP as multiplier farms (and receive low cost improved breeding stock), must invest in infrastructure. The multiplier farms can apply for concessional loans under the Matching Grants Program. Loans are made under normal lending conditions, but at concessional rates. The maximum loan is WST16,000, with 0% grace period for 12 months, 8% for 12 to 24 months and then commercial rates thereafter (currently 12%). However, the opportunity to borrow funds for these inputs is limited through the commercial banks. The Asian Development Bank is also said to be interested in farm financing, but beef farms are not yet included in the portfolio.

3.2.3 Vet products

The APHD is said to be responsive to animal health problems, treating for mastitis and also being sought to drench skinny cattle in case of worms. Remedial worming however has limits as some Fijian farmers drench monthly and this has caused resistance to Ivermectin. Treatment through management, such as rotation and low stocking rates, is effective but can be hard for small uncommercialised farmers. It is also likely that most under-performing animals suffer from a mismatch of nutrient supply-demand, and nutrition is the priority for more productive cattle.

3.2.4 Breeding

The vast majority of breeding is done with local bulls. As discussed later in Section 3.3.3, there are 3,500 bulls in Samoa, which make up 12% of the herd and a bull to cow ratio of 1:8 (MAF, 2013).

Cattle breeds in Samoa derive from mixes of Santa Gertrudis, Piedmontese, dairy cattle and local mixed breed "povi", which is a tough but low producing beef animal. In addition to an earlier shipment, Samoa imported 13 Droughtmaster bulls and 33 Droughtmaster heifers from Australia in September 2015. The elite breeding stock are held at Tongitongia breeding station and the current herd consists of 48 cows and 3 bulls.

Station bulls are distributed to eight multiplier herds (five in Upolu and three on Savaii). The multipliers are expected to sell the breeding stock to small-holders at a set price (WST5.50/kg liveweight weighed by APHD staff). The target is to turn-off weaners at 150 to 200 kg. If weaners exceed 200 kg and there is no demand for the breeders, then multiplier farms are permitted to castrate and sell to alternative sale channels. Several interviewees said that more education was required for Samoan farmers to develop a willingness to pay for breeding stock.

3.2.5 Pastures

Grasses in Samoa include batiki, guatemala, setaria, buffalo and guinea grass. Ground legumes include centro, hetero, caliandra. Tree legumes include gliricidia (including for fences and feed), and leucaena was introduced (by IFAD) and is dense in some areas. Species introduced in the 1990s include buffalo, setaria, napier, glycine and jointvetch (MacFarlane, 1988) and signal and desmodium (Reynolds, 1980). Signal and setaria grows better in the dry west and batiki better in the wet south.

The 2012 Cattle Census found that batiki is by far the most common pasture species in both Savaai and Upolu, followed by signal grass and native grasses (carpet and T grass). There are also small amounts of setaria and legumes (Figure 2).

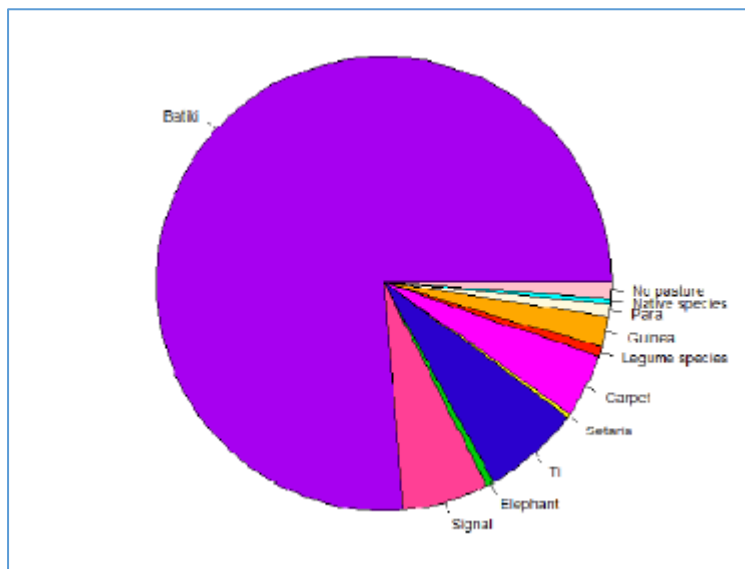


Figure 2: Most common pastures species in Samoa

Source: MAF (2013)

Grasses and legumes grow virtually all year-round, however the grasses tend to be high in fibre and low in energy and protein. Interviewees said that there are few areas of improved pastures, leguminous species, supplementary feeding or urea blocks.

Navua sedge has grown to become a common and problematic weed, especially over the last five years. Setaria is useful to control navua sedge, through slashing paddocks (by hand) and transplanting setaria cuttings to choke out the sedge in about three months. Others common weeds are soda bush and broom sida.

Research was conducted on pastures in the 1970s through to the 1990s (Reynolds, 1980; Reynolds, 1981; MacFarlane, 1998). There has been little pasture research since this time and pastures have not featured in government and World Bank projects until now. The APHD can provide advice about pastures and the development of nurseries. Farmers receive cuttings and training from APHD however it has been found that the stock is often unplanted.

Interviewees thought that Samoan small-holders would take up pasture improvement if given the information and impetus. However, fencing, clearing, and planting requires time and commitment as it is hard to maintain pastures and control weeds in Samoa. Mekong and Mulato II would be suitable species for well resourced farmers. Stylo and leucaena would also be obvious legume choices that seem underutilised at present.

3.3 Production

This section presents a broad data map from the PHC, which relies on data from the dedicated Cattle Census conducted in 2012 by the APHD and the World Bank SACEP project. Methods are outlined in MAF (2013).

3.3.1 Spatial distribution of cattle and cattle households in Samoa

Figure 3 shows the distribution cattle and cattle households in Samoa. The PHC of 2011 records 45,000 cattle in Samoa, with 20% of households raising cattle. Some districts in the south of both Upolu and Savaii have high cattle numbers (e.g. 1,500-3,000 cattle in each). Proportions of households with cattle are highest in districts shown in red (south Savaii) and yellow (Savaii and south Upolu).

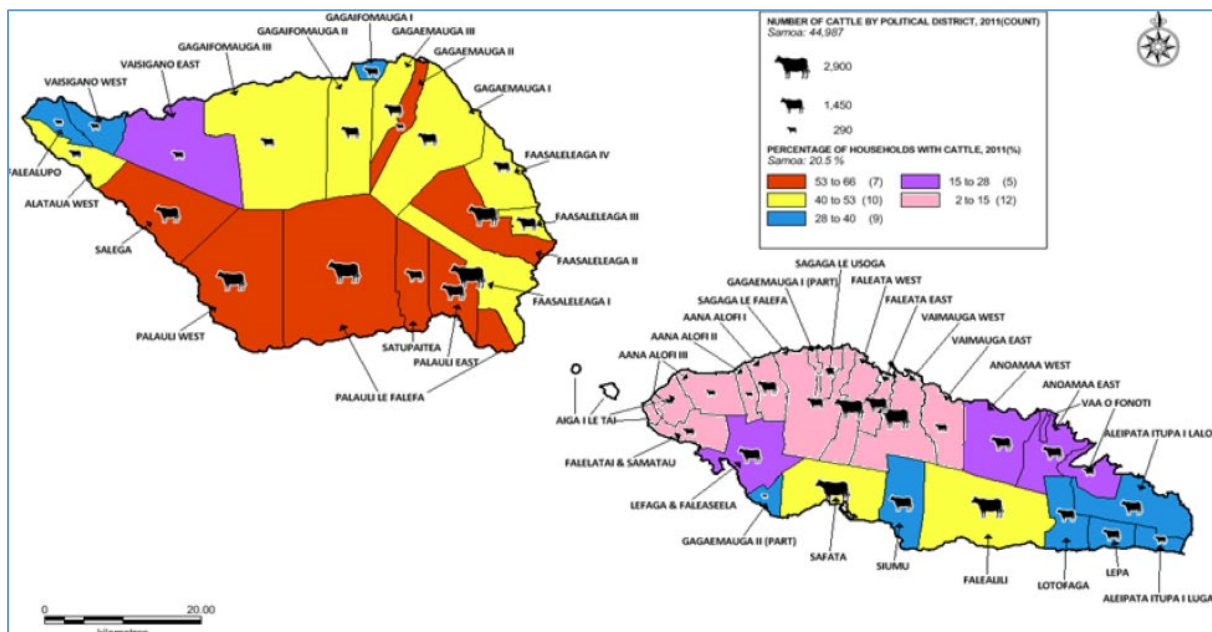


Figure 3: Number of cattle and percentage of households with cattle in Samoa by political district, 2011. Source: SBS (2011).

3.3.2 Temporal trends

While census statistics have limitations, they provide an indication of change over time and are shown in Table 1.

Table 1: Recorded cattle numbers by SBS, various years

Year	1989	1999	2009	2015
Cattle numbers (head)	13,431	27,883	38,954	56,504
Average annual compound growth (from previous census)		8%	3%	6%

Source: SBS and MAF (various years)

Census data show high growth in cattle numbers in Samoa over an extended period. However, the dedicated cattle census in 2012 found significantly lower numbers. While APHD has attempted to compare the SBS and Cattle Census results, this is not attempted here due to the incompatible data sets.

3.3.3 Cattle herd and indicators

The 2012 Cattle Census found that Samoa has only 29,553 cattle and 2,903 cattle holdings, significantly lower than previously reported. The herd composition was:

- Cows – 37% - this is low suggesting a high culling rate and/or high consumption of female breeding stock. The census found another 13% of the herd were 2-year-old heifers, suggesting ample replacement stock;
- There were 6,172 calves < 1-year-old, which based on cow numbers (1,109) would suggest a calving rate of 56%, but is reported as 48%, which is low;
- The low rate is not due to lack of bulls, which make up 12% of the herd with a bull to cow ratio of 1:8. This rate is high, as could be expected in systems with low scale production, where small household keep bulls for breeding, or have low rates of castration and culling;
- Perhaps relatedly, steers (> 2-year-old) account for just 5% of the herd, suggesting low castration rates and/or high sales and consumption. The low castration rates inhibit the supply of steer meat to the butcher market and diverts supply toward the fa'alavelave markets (bulls at a young age). An over-supply of mature bulls causes constant fights between bulls, broken fences, and risk; and
- Mortality rates are 4%.

3.3.4 Infrastructure

The census also surveyed infrastructure and facilities, which were at low levels.

Only 3% of holdings had stockyards, nearly all required repairs, and most didn't have loading ramps. The proportions of stockyards and ramps increased at higher scale levels but were still low even for holdings >100 cattle. The undeveloped facilities constrain animal management activities, sales. They also make research difficult.

The low incidence of fencing, especially internal fencing, requires tethering undertaken by family members and can result in poor pastures, and low reproduction rates.

Road infrastructure too is undeveloped, with only 33% of holdings accessible by sealed roads, and about 40% accessible by 2WD cars or trucks.

3.3.5 Types and scale of farms

While sections above report average data, there are differences between farms, most notably between multiplier farms (below) and average farms (and within multiplier farms).

Figure 4 reports data on the scale of cattle production in Samoa by household.

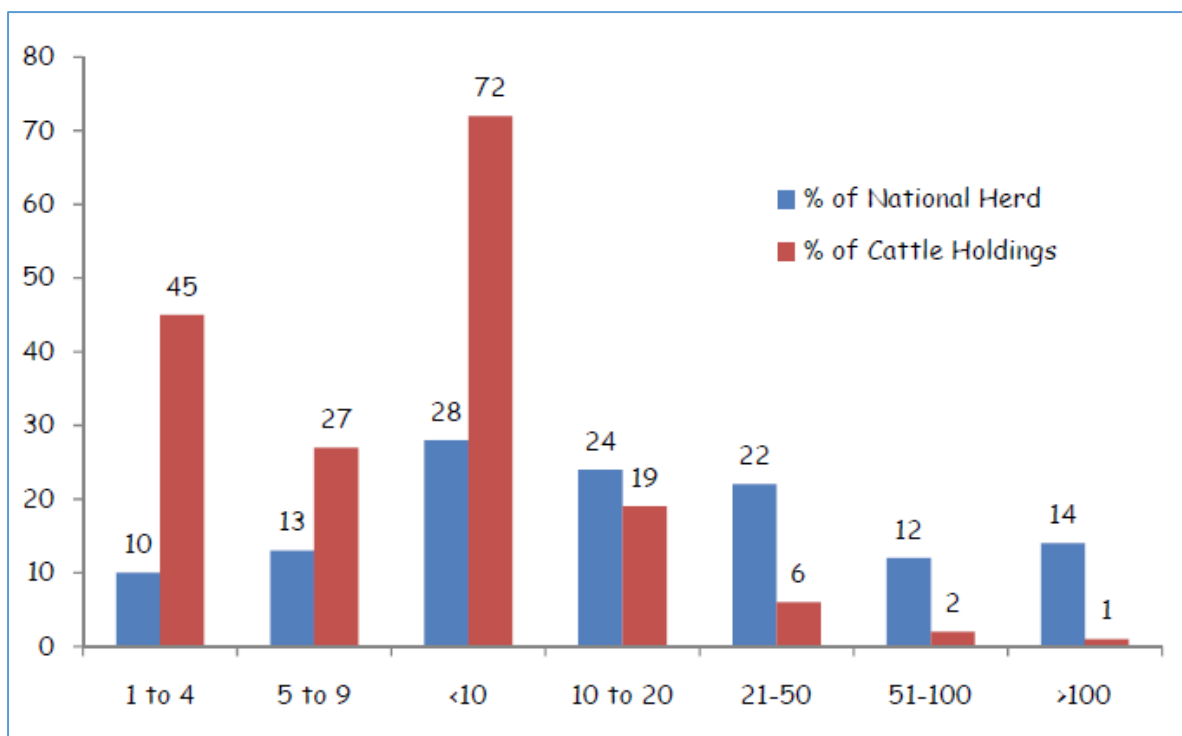


Figure 4: Percentage of national cattle herd and percentage of cattle holdings by size of holdings, 2012
Source: MAF (2013)

The average cattle farm has 4.3 total cattle with only 10% of farms recorded as having more than 20 cattle. Typically, cattle are run by family units on land identified with clan groups. The elders of the clan usually own more cattle than other members, however all cattle are grazed together as a mob. As a result, it is difficult to identify who, if anybody, is responsible for the management of the herd or individual cattle, which is not conducive to productive management.

3.3.6 Multiplier farms

Eight multiplier farms participated in SACEP (five in Upolu and three on Savaii). The multiplier system is a means to distribute improved genetics but may also demonstrate improved practice to encourage a shift from subsistence to semi-commercial systems. Should the systems be shown to be viable, government and donors are hoping for uptake from other farmers and the private sector.

Larger farms have incentives to join SACEP as multipliers are eligible to receive low cost breeding stock. However, farms must meet criteria to be eligible including: a farm size of at least 20 acres; hold 30 breeders; and demonstrate investment in infrastructure. They must also agree to develop a business plan and monitoring by APHD for liveweight, body condition, pregnancy status, animal health, castration, dehorning, tagging new calves and pasture assessment, every three months.

APHD estimate that ~10,000 Ha of land has been fenced (it wasn't specified if this was boundary or internal fencing). However, they state that less than 50% of land is improved pastures and APHD would like to see increased growth rates on existing and improved pasture.

3.3.7 Church and school farms

In addition to individual household farms, there are a number of commercial or church farms that are linked to schools. In addition to the government farm at Togitogitia (see Section 3.3.7), there is a theological farm under the Congregational Christian Church of Samoa which consists of three separate blocks, totally around 600 acres. Much of this land however is planted to coconuts or uncleared although there are plans for development. There are currently 100 cattle on the farm.

3.3.8 Sales channels for slaughtered cattle

The 2012 Cattle Census recorded 8,884 cattle slaughtered in 2012, equating to a relatively high slaughter rate of 30%. Of these animals 21% were slaughtered for retail, 23% were sold into the fa'alavelave market, and 56% used for own consumption in fa'alavelave. The proportions used for fa'alavelave were higher in Savaii because of the absence of retail outlets, although some butchers from Upolu buy cattle from the island.

For local markets, cattle are sold by farmers directly to consumers and negotiated on a per head basis. For retail markets, cattle are sold directly to butchers for slaughter on-farm, on a per kg carcass weight basis (weighed on-farm). There were reported to be cattle traders and intermediaries (Farm Consultancy Services, 2015) although it has been reported (by a butcher) that they no longer operate.

3.3.9 Prices

Cattle prices for local and fa'alavelave consumption are set on a per head basis. These are variable based on a range of market and social factors, but are widely regarded as being competitive with, and often above, prices offered by the retail sector. However, the following provides a guide on the (flat) pricing structure of a butcher in Apia, paid on a per kg carcass weight basis:

- Steers. WST7.50 – 8.0/kg;
- Heifers. WST7-7.50/kg; and
- Cows and bulls WST5.50-6/kg.

3.3.10 A financial analysis of a representative farm

Investment appraisal analysis of a representative cattle farm was conducted in a separate analysis (Farm Consultancy Services, 2015). This is difficult because of the traditional and communal ownership of land and infrastructure makes identifying capital costs almost impossible. The values given for land sales at approximately WST20,000-30,000 per acre is too expensive for cattle or other types of farming. Further, the complex nature of land ownership in Samoa, which is bound up with the matai title system, means that only about 20% of total land area is available for freehold purchase.

The analysis for a relatively large 20 Ha farm with 10 cows and a total of 23 head, suggests capital investment was WST33,000 with all cattle valued at WST1,000 each and infrastructure at WST7,000. No value was imputed against the land. The farm sells about five cattle per year and turns over less than WST7,000. A few costs have been allowed for maintenance, but no labour or management costs are included.

Sales channels

The representative farm receives higher returns from selling into the fa'alavelave market than the formal retail market due to higher prices. This is before the additional management effort required to achieve the quality standards demanded in the retail market is included. Internal rate of return (IRR) in the fa'alavelave model returns are 18%. Using retail prices, but keeping all other parameters the same, the IRR is 12%. Thus, to capture supply, butchers in the retail market will have to pay higher prices. Assuming producers sell all their cull cattle into the fa'alavelave market which gives a higher return, then the retail price for beef would have to rise to WST10.50/kg to balance out the returns. Average retail prices for beef currently sit at WST7.70/kg.

Productivity improvements

The financial model also tested how changes in productivity would affect returns, aiming at an IRR of 18% for the sales into the retail channel.

Carcass Weight

The carcass weight would have to increase from 180 kg to 230 kg in the same time frame. Cull cows would also have to increase from 170 kg to 200 kg, which is not likely without extra inputs. Pasture costs were therefore increased from WST10 to WST57/Ha to achieve the weight gain. In this case the carcass sale weight would have to rise to 270 kg and would be very difficult to achieve. For this reason, an increase in carcass weight must be accompanied by an increase in price.

Calving Percentage

Calving percentages were already assumed to be 40% in the baseline case. This would have to rise to 53% at the current retail price to match the returns from fa'alavelave (18%). Again, this is only likely to happen with improved inputs. Making the same increase in pasture costs (WST57), the calving percentage would have to increase to 62%.

Quicker turnoff

The models assume the animal is three years old at sale, however it is possible for a well-fed animal to reach mature sale weights at two years of age. Assuming a two-year turnoff, this raises the IRR to 15%, which is not sufficient to make the difference. Adding the extra costs necessary to achieve this will only make this less achievable.

Lower Capital Costs

Reducing the capital costs by 30% (WST32,000 to WST22,000) raises the IRR to 18%. However capital costs are already low and include no capital cost for land. It is felt this is not realistic and would certainly not provide a business model that a new farmer would be able to invest into.

Farm Scale

Increasing the opening stock numbers by 50% also achieves an 18% IRR. However, this option would require extra capital, which is already low, and extra pasture costs. As such it is felt to be unrealistic.

3.4 Slaughter

3.4.1 Bush kill

The vast majority of cattle are slaughtered on-farm. Animals slaughtered for fa'alavelave are shot in the paddock by the farmer, the buyers, or a village slaughterman who is paid a fee and/or offered offal.

3.4.2 Butchers and wholesalers

Butchers and wholesalers also slaughter on-farm. The carcasses are quartered on-farm and transported by a refrigerated or unrefrigerated truck to depots for butchering and storage in cold storage facilities.

One such butcher / wholesaler is Samoa Meat Supplies (SMS). SMS started in 2013 and undertakes slaughter, distribution and processing, including small goods. The company has chiller capacity of 50 carcasses. The major constraint is sourcing cattle; therefore, they will buy any cattle available to fill the chiller and will sometimes distribute the product to retailers on credit. The company buys only local cattle from local farms mainly from Upolu but may also buy from Savaii every month or so, where there are older, heavier cattle. The butcher ferries their own refrigerated truck to Savaii, where they bush kill, fill the truck and ferry the produce back. Samoa Meat Supplies sell into a range of markets including high end restaurants and resorts (for example eye fillet at WST40/kg, sirloin at WST22/kg), lower end Chinese restaurants and fishing boats, and some exports to Tokelau.

The private butchers received training under SACEP, who are interested in establishing a grading system.

In addition, a company called Krissy produces a local, higher quality tinned corned beef product that competes with cheaper imports from Fiji.

3.4.3 Mobile Slaughter Unit

As mentioned in Section 2.1, the *Slaughter and Meat Supply Act* 2015 specifies that beef that enters the retail sector must be inspected and certified. To provide the necessary facilities and services, a mobile slaughter unit (MSU) has been developed under SACEP and operated by APHD. The MSU is used in conjunction with a FUSO truck. Slaughter is conducted with a slaughterman and others including an inspector that accompany the truck.

The process for conducting transactions in Apia is as follows: farmers that want to sell cattle contact the retailer; the retailer identifies the cattle they want to buy; a price is negotiated; and farmers contact the APHD to get the MSU to site. The animals are stunned, bled, stimulated, hoisted on to rails, skinned and quartered. The rails have a 750 kg capacity (about 180 kg per carcass). The carcasses are weighed at the retailer / butcher, which the farmer can observe, and the farmer is paid (in Apia, not at the farm gate).

The MSU has a notional capacity of about 15 large animals per day but is constrained by factors such as storage capacity, scattered availability of cattle and therefore travel time between lots. Actual slaughter is only about 12 cattle per month. This volume is expected to increase when the SMS Act is implemented in March 2019, although it would also have to be competitive with alternate channels (unregistered slaughter and fa'alavelave use). Retail demand is around 120 head per month, and the ferry cost to Savaii is WST600 so a full load of around six 200 kg carcasses would be required to make this option viable.

Use of the MSU is currently WST50/animal, paid by the farmer. This cost is subsidised, and actual cost is likely to be WST150/animal, including truck, maintenance and staff costs (although an analysis suggests that even at that cost, it would not be viable, or competitive with other channels). Government (APHD) and SACEP hope that retailers will be willing to pay these full costs to ensure full cost recovery or that a private operator will take over the unit. There are also obvious issues with infrastructure for the operation of the MSU on-farm such as yards and road access.

Thus, the operation and viability of the MSU will be re-assessed when the SMS Act is implemented (March 2019). If a static plant is installed (see Section 3.4.4) the MSU may be moved to Savaii. The MSU and policy is designed for cattle, but if successful could be extended to other animals, including sheep.

3.4.4 Static unit

There was an abattoir in Samoa, owned by Western Samoa Trust Estates Corporation (WSTEC), which in the past held the majority of Samoa's cattle (12,000 cattle) but was closed in the mid-1990s. The closure of the plant and farm is said to have had a negative effect on the broader cattle production sector. Both SACEP and SAFPROM are proceeding with plans for a new static abattoir to be located in Nu'u on the outskirts of Apia. The plant will be modular / containerised (20 ft) and can be moved to another site, scaled up, or dismantled and used for other purposes. It is planned to have a capacity of 12 cattle per day. The plant was planned to be operational by December 2018 but appears to have been delayed. Sheep could also be killed in the plant, on different days to cattle.

3.5 Consumption, retail and imports

3.5.1 Consumption

APHD (2014) estimated that per capita meat consumption in Samoa in 2013 is very high at 103 kg, with 14 kg from local product and 89 kg from imported product. Of the 103 kg consumed, 73% was imported chicken. The average annual beef consumption was also high at 12 kg of which 9 kg was imported and 3 kg was local product. Large increases in meat consumption over time are shown in Figure 5.

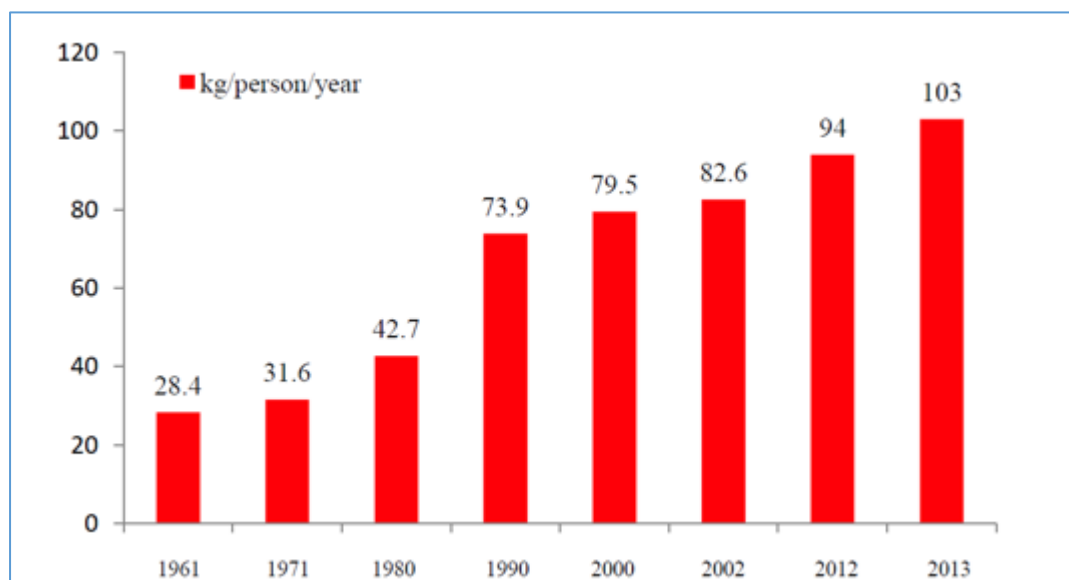


Figure 5: Per capita meat consumption, 1961-2013

Source: Farm Consultancy Services (2015)

3.5.2 Fa'alavelave consumption

Fa'alavelave events include funerals, wedding, installation of chiefly title, the unveiling of a new home, church or business, or a church conference. A range of gifts are presented, of which beef is important. Beef was a small item in the past, but now accounts for about 20% of meat offerings (Farm Consultancy Services, 2015). Beef is sourced from own farms or from other farmers. Price is negotiated on a per animal basis but without reference to quality characteristics, of which there are few in most forms of Samoan consumption.

Beef fa'alavelave gifts average four carcasses for significant occasions. Data from the HIES found that there about 2,500 events requiring fa'alavelave donation, which accounts for about 7,000 cattle. Most beef is consumed at ceremonies, but it is important to note, however, that significant proportions of beef is on-sold into the retail sector or gifted back to the major donors or important guests such as church ministers and government officials.

There is some debate about the value lost or gained from fa'alavelave. Ceremonies can be seen as an efficient distribution and consumption mechanism for a perishable product. Furthermore, beef that is not consumed can be on-sold and generates cash income for families. On the other hand, the beef is de-valued (by 30-50%) between ceremony sites, through intermediaries (re-sellers and wholesalers) to consumers (Farm Consultancy Services, 2015) and increases the risks of contamination.

3.5.3 Beef retailing

The commercial retail sector in Samoa consists of:

- Five main supermarkets with 17 outlets (Lucky Foodtown; Frankies Supermarket; Lynn’s Supermarket; Farmer Joe; Mynas Supermarket);
- Hotels and restaurants; and
- Butchers such as Samoa Meat Supplies, which both retail and export beef.

Since 2002-2003 APHD have produced annual meat marketing reports on the domestic retail sector with 2011-12 and 2012-12 discussed below. Longitudinal findings of the reports are also presented in Figure 6.

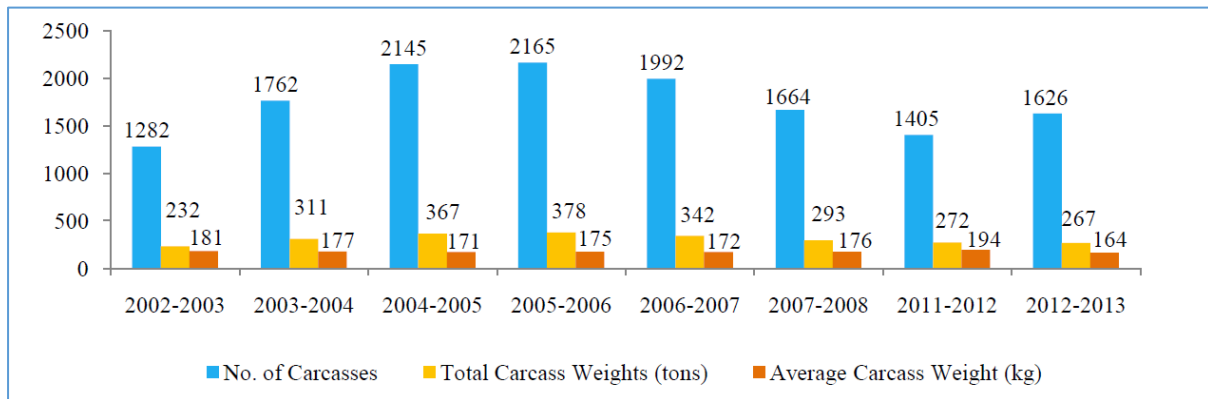


Figure 6: Local retailed beef meat statistics recorded during July 2002-June 2013.

Source: APHD (2014)

The figure suggests that the volumes have varied considerably over the years reviewed, from 2,145 tonnes in 2005-6, to 1,405 tonnes in 2011-12. Average carcass weights have shown a downward trend from 181 kg to 164 kg, indicating low input production practices. The average price of beef increased by 40% per year from 2006 to 2014, although was equivalent to the retail price index of the same period (Farm Consultancy Services, 2015).

In 2011-12, it was estimated that local retailers sold 1,405 carcasses with an average weight of 194 kg (or 319 tonnes) with prices averaging WST6.54/kg (WST1.8million). This local beef, made up just 33% of all beef sold through retail channels, the remaining 67% was imported beef. In 2012-13, retailers sold 1,626 locally produced beef carcasses, with an average weight of 179 kg (276 tonnes) with a price of about WST7/kg (WST2 million), cheaper than the average imported beef in that year.

Longer term data from the AHPD (2002-14) suggests that the number of cattle destined for retail sale has been declining, and that carcass weights have stayed relatively unchanged at relatively light weights of 180kgs liveweight.

3.5.4 Imports

Volumes and value of imported beef are shown in Table 2. Note that these figures (both volume and value) are about double that presented in MAF (2016). Most of these imports will be sold through retailers, although some will flow through importers/distributors to the HRI trade. These figures suggest that in 2012-13 the volume of beef imported is similar to the volume of locally produced beef consumed in the retail sector (267 tonnes), beef sold into the fa’alavelave market and own-consumption in fa’alavelave. Import duties on beef are 8%.

Table 2: Imports of frozen and chilled/fresh beef 2010-17

	Weight (tonnes)	Total value (US\$ million)	US\$/kg	% weight fresh or chilled (vs frozen)
2010	1,081	3.0	2.8	73%
2011	1,489	5.0	3.3	82%
2012	965	3.1	3.2	73%
2013	1,290	4.1	3.2	73%
2014	1,532	4.7	3.1	74%
2015	1,354	4.2	3.1	81%
2016	1,316	3.3	2.5	92%
2017	1,057	3.8	3.6	87%

Source: UNComtrade 2018

It seems unusual that the quantity of fresh beef is relatively high, and higher than frozen product. This maybe a classification error that may include cooked or tinned product. Only 17 tonnes of processed (salted, brined, dried, smoked) bovine meat was reported in 2016.

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