Country Pasture/Forage Resource Profiles

FRENCH POLYNESIA

by

Eroarome Martin Aregheore

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1. INTRODUCTION

The atolls of French Polynesia are scattered between 13^0 and 22^0 S and 35^0 and 148^0 W. French Polynesia is a collection of island groups and an overseas territory of France (TOM) in the south central Pacific Ocean about 7 500 km from Paris, which covers an area (including inland water) of some 4 500 km^2. The capital is Papeete on the island of Tahiti. There are 130 islands in all and they are divided into five archipelagos: the Society Islands, Tuamotu Islands, Gambier Islands, Marquesas Island and the Tubuai Islands. Tahiti, in the Society group, is the largest island and has a land area of 1 042 km^2 (Doumenge, *et al*. 1988) – see Figure 1.

At the end of the nineteenth and the beginning of the twentieth century, the bulk of immigrants to French Polynesia were Chinese. Most of the current Chinese population was born in the archipelago. Most of the European newcomers are concentrated in Papeete's urban area. The major town also attracted people from the peripheral archipelagos such as Tuamotu, Leeward Islands and the southern islands. The Makatea mine attracted Polynesians as well until it closed in 1965.

Until the discovery and exploitation of the Makatea phosphate deposit in 1906, the economy of French Polynesia was based on agriculture and fishing. Copra production was the main agricultural activity (Reboul, 1982) but today, after tourism, the black pearl is the main export earner followed by coconut oil, unworked shells, perfumed soap and whole chilled or frozen fish (Trade NZ). French Polynesia has experienced significant growth over the years. Population was given as 227 800 in 2000 (by Trade NZ), 233 500 by SPC mid-2000, 259 596 at the 2007 census (SPC, 2008) with a mid-2008 population estimate of 263 267 and a mid-2010 figure of 269,460 with an annual growth rate of 1.2% by SPC (2008) and as high as 283 019 (July 2008 estimate) by World Factbook, with a 1.425% growth rate.

Generally, agriculture accounts for less than 5% of the gross national product and is dominated by copra and vanilla for export and tropical fruits for local consumption. Of all the copra produced, about 13 443 tonnes, (Douglas and Douglas, 1989) are sold to a corporation in which the territorial government has a controlling interest. Fresh water and marine fishing as well as oyster and shrimp farming provide livelihoods to many islanders. Livestock production is subsistence and over the years the number of cattle (beef and dairy), goats and sheep has declined considerably. To meet local demand for animal protein the country relies heavily on imports (Table 1). However, efforts are under way to continue to

Figure 1. Map of French Polynesia
Source: The World Factbook

Table 1. French Polynesia statistics of ruminant livestock numbers, meat and milk production and imports for the period of 1997–2007

Item	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle (,000)	7.6	9.2	9	11	8.5	6.8	8.3	9.3	7	12	12
Goat (,000)	16	16	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Sheep (head)	420	420	440	440	440	440	440	440	440	440	440
Beef prod (Mt)	145	175	168	207	157	117	156	174	129	130*	130
Milk, fresh prod. (Mt)	1 379	894	1 305	1 232	1 201	978	1 083	1 071	1 096	1 350	1 350
Mutton (Mt) imports	1 141	1 296	1 227	1 272	1 325	1 280	1 187	1 282	1 256	1 071	n.r
Milk fresh (Mt) imports	3 594	4 004	3 331	3 711	3 863	4 294	4 373	4 708	4 636	4 604**	n.r
Cattle imports (head)	4	5	5	-	-	-	-	12	-	-	n.r
Beef & veal imports (Mt)	5 243	5 492	5 490	5 223	5 927	6 360	6 253	6 607	6 935	6 188***	n.r

** Total meat production in 2006 was 973 mt (including beef, chicken (630 mt), duck, goat, pig (1 100 mt) and sheep) and 1 960 mt of fresh chicken eggs*
*** also in 2006 some 1 221 mt of whole dried, condensed and evaporated milk were imported*
**** also in 2006 some 1 702 mt of pig meat, 479 mt of turkey meat and 11 412 mt of chicken meat meat were imported.*
n.r. = no record; No data for 2008
FAO on-line statistics database (2009)

build up existing cattle herds and the existence of imported stock has enabled much of the local demand for milk and beef to be satisfied.

2. CLIMATE AND AGRO-ECOLOGICAL ZONES

The climate is tropical and influenced by the marine environment. The temperature of the lagoons differs little from that of the open sea. The climate of the atolls is fairly homogeneous over the immense zone. There is no really marked differentiation between the seasons. Throughout most of the tropical belt a distinction is drawn between a hot (or rainy) season and a cool (dry) seasons. Here the hot season corresponds to periods of heavy rainfall. The rains begin in November and then often last until June. The cool season that is from July to October is associated with low rainfall.

The distinction between hot and cool seasons is a very relative one, since the mean temperatures are 27°–28 °C and 22°–26 °C respectively, with the difference increasing from north to south. At Papeete, the annual average temperature is 26 °C ranging from 21 °C in the cool and dry season (May–October) to 33 °C in the warm season (November–April). Precipitation is abundant varying from 3 050 mm near the coast to 4 060 mm in the mountains. Relative humidity is always high (80–90%). Annually between December and February, French Polynesia is subject to typhoons. The atolls are always breezy due to the constant trade winds and they receive a remarkable amount of sunshine. Rainfall distribution is subject to the southeast trade winds.

French Polynesia can be divided into two distinct physiographical groups: the less numerous but larger high volcanic islands (Society, Tubuai, Marquesas and Gambier) and the more numerous low coral islands (e.g. Tuamotu). The volcanic islands are mountainous with rugged peaks, deep and narrow valleys with fast running and flowing rivers, narrow coasts, fertile soil and dense vegetation. The coral islands have no underground water reserves; rainwater is the sole source available to meet domestic needs (Doumenge, *et al.* 1988; Reboul, 1982). Coral islands also lack soil cover and permanent streams, raising serious supply problems for agriculture and drinking water. The only major vegetation cover on the coral islands are the coconut plantations.

3. SOILS AND TOPOGRAPHY

Soils are mainly ferralitic on the high volcanic islands; rendzina from coral forming limestone and sand on coral atolls. Soils here developed on coral debris and shells that have been fragmented and redistributed to a greater or lesser degree. They are enriched by organic matter in varying amounts and

in the depressions are sometimes exposed to the tide. At depth above the water table, a calcareous crust or pavement appears. Alongside the raw or immature mineral soils are the hydromorphic soils; and in some cases bog soils that are the most readily utilizable soils. Generally covered by coconut palms are the calcimagnesic soils and more particularly rendzinas (type rendoll), characterized by a thick brownish black humus horizon, followed by a friable horizon that is lighter in colour. This is then followed by a calcareous crust of 10 cm, or thicker.

The soil varies according to the nature of microclimate that prevails. The shallow pavement soils dry out very rapidly, whereas the gravelly profiles rich in humus at the surface conserve water better. Soil moisture is thus a major problem for some soils particularly during the driest season of the year. The majority of the physical and chemical characteristics of atoll soils combine to give the vegetation on atolls the dual nature of being extremely limited and highly specific.

The Tuamotu group consists of uplifted maketea type islands. Thus the soils are makatea types (literal meaning in Polynesian is "white rock") that are not suitable for any meaningful agricultural activities. The maketea is a coral limestone that has been uplifted so that pure lime is at a considerable elevation above sea level. Thus the poor soils derived from the old limestone reefs are usually of very high pH (Prof. Randy Thaman, personal communication).

Due to the steep slopes and difficult access on the higher (volcanic) islands, agricultural areas are restricted to coastal plains with alluvial hydromorphic soil. Agricultural potential is even more limited especially with regard to food production and horticulture.

4. RUMINANT LIVESTOCK PRODUCTION SYSTEMS

Livestock husbandry includes raising pigs, cattle and goats. Ruminant livestock production on the atolls is carried out on a small scale and the simplest systems employed are mainly extensive or free range and semi-intensive. Under the extensive or free-range system the animals are allowed to roam free and search for their own feed. No housing is provided at all in this system. The animals are unattended too because very few animals are kept and the availability of pastures (good or poor) is uncertain in most of the islands.

In semi-intensive system animals are tethered along the road embankments to graze during the day and are taken home in the evening. They are offered crop residues and kitchen waste when available, as supplements. Cattle, buffalo and goats are reared in small numbers where there are enough resources. Small ruminants pose a different problem. Sheep and particularly goats are often seen as being destructive to the environment, mostly because they came into the islands after all other ruminants (cattle or buffalo), or because they have been badly managed due to the shortage of pasture. Ruminant livestock production in French Polynesia is being improved by the importation of dairy and beef cattle breeds from New Zealand and Australia to upgrade the existing local breeds.

5. CONSTRAINTS TO DEVELOPMENT OF PASTURE-BASED LIVESTOCK PRODUCTION SYSTEMS

1. Soils are of poor chemical composition and physically unstable. They are deep, dark red and have a distinct tendency to harden into gravel or ferralitic crust. Coral soils are of low fertility and high pH. Therefore the soil is not suitable for any meaningful development into pasturelands.
2. The country in general has little land for producing food on a large scale far less for pasture based livestock systems. Available land is used for the growing of coconuts, cassava, pineapple, water-melon, potatoes, tomatoes, lettuce, cucumbers, taro and bananas.
3. The rearing of cattle is generally limited because of land ownership restrictions.
4. There is the lack of arable land on the steep slopes for pasture or crop farming.

6. THE PASTURE RESOURCE

The vegetation of the land areas on the atolls belongs to the flora of the indo-Pacific inter-tropical coral zone that comprises some 200 vascular plant species, which are explained by the phenomenon of decline in the number of species from west to east (Guerin, 1982). The availability of pasture is mainly under coconut palms (*Cocos nucifera*). Although French Polynesia is a minor ruminant livestock producing country, it has 24 000 ha of pastures under coconuts and 69 000 ha of intercropped or coconut-covered land (Macfarlane, 1998). This indicates a potential to develop ruminant grazing. The ruminant livestock population is far less than available pasture resources, therefore available pasture resources are under utilized.

6.1 Improved pasture grass varieties

The grass species most common for livestock grazing in French Polynesia are:

Para grass (*Brachiaria mutica*). This is commonly used as a pasture grass in rotational grazing and can also be cut for green fodder or used for hay. Para is a perennial grass that is widely distributed in the tropics and subtropics especially in areas with heavy rainfall. It is not a suitable grass species during the dry season because of its high water requirement and is best suited to very wet even waterlogged soils. It can be cut at intervals of 4–6 weeks, and it compares well in quality with most tropical fodder crops.

Carpet grass (*Axonopus compressus*). This is a low growing, stoloniferous perennial grass. It is well adapted to a wide range of soils. It spreads both by runners and by seeds and is well adapted to wet and shady conditions. It is generally low yielding but grows well together with the legumes.

Creeping guinea grass (*Panicum maximum cv. Embu*). This is a fine stemmed short guinea with prostrate creeping habit and has produced high dry matter in cutting trials under coconuts. It can be propagated by seed or by parts of the vegetative root-stock.

Other grasses are Johnson grass (S*orghum halepense*), *Lepturus repens*, *Panicum pruriens* and *Syntherisma pelagica*. In general these grass species are well distributed in French Polynesia (Guerin, 1982) where the soil and weather permits.

6.2 Improved legumes

These include the creeping legumes and leaves of trees and shrubs (Guerin, 1982; Raynor, 1992). The most important creeping legumes whose vines could be fed to grazing animals as supplements are:-

Dolichos lablab: This is a flat bean and it is hardy and grows well in French Polynesia. It is not cultivated but grows wild.

Leaves of shrubs and trees used with the available grass species are *Acacia simiplicifolia*, *Cassia glauca*, *Gliricidia sepium*, *Erythrina crista-galli*, and *Spondias mombin*. The leaves of these shrubs and trees are rich sources of protein and could be used to supplement ruminant livestock grazing low-quality forage. Based on the available pasture resources found, Macfarlane, (1998) reported that French Polynesia as a country has the potential to develop ruminant grazing; however, as mentioned earlier, French Polynesia is not presently a major ruminant livestock producing country.

Also the leaves and vines of sweet potato (*Ipomoea batatas*) and *Phaseolus vulgaris* are used as fodder. Sweet potato grows very well in French Polynesia.

6.3 Weed control

The introduction of several grass and legume species was also accompanied by the introduction of herbaceous plants that are commonly classified as weeds. The weeds of major economic importance in French Polynesia are *Euphorbia hirta, Solanum viride, Cenchrus echinatus, Centotheca latifolia, Cyperus polystachus*, *Eleusine indica* and others. These weeds are controlled manually or by the use of herbicides.

6.4 Recent initiatives in forage improvement

Efforts are being made to increase the ruminant livestock number in order to reduce the dependence on the import of meat and meat products, including milk. This is being facilitated by the import of dairy and beef cattle breeds from New Zealand and Australia to upgrade the existing breeds. Efforts are also geared towards the introduction of more adaptable grass and legume species that could survive the conditions that prevail in French Polynesia. This effort is also being facilitated through the revitalization of indigenous agroforestry systems that represent a tremendous diversity and in many cases, unique and successful adaptations to harsh environments. Finally it has been suggested that governments of countries, including French Polynesia, with low numbers of ruminant livestock should be involved in supplying inputs and technical support to the few livestock farmers as an incentive (Anon., 1998).

7. RESEARCH AND DEVELOPMENT ORGANIZATIONS AND PERSONNEL

None identified

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9. CONTACTS

This profile will be updated from time to time and was written by **Eroarome Martin Aregheore** while he was at: The University of the South Pacific, School of Agriculture Alafua Campus, Apia, Samoa.

Present address/contact:
Eroarome Martin Aregheore, PhD
Marfel Consulting (Agricultural and Educational Services)
118-7341, 19th Avenue
Burnaby, BC, Canada, V3N1E3
Tel: 604 395 5428
778 991 2295 (Cell)
Email: aregheore_m@yahoo.com

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