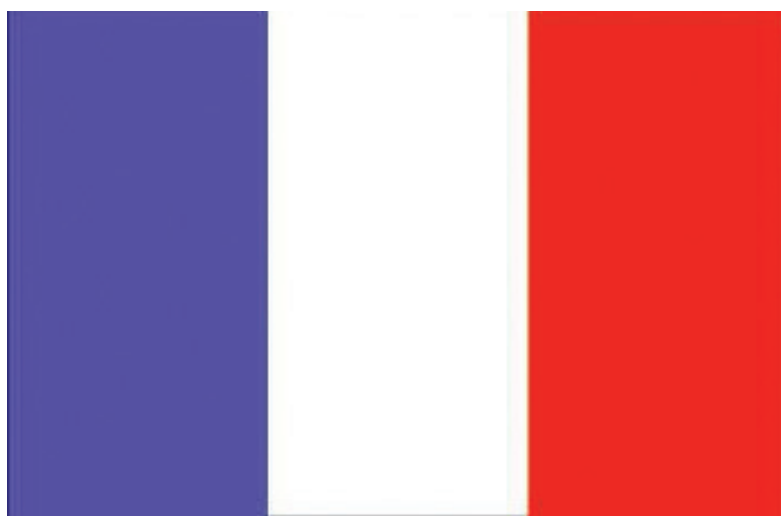


# Country Pasture/Forage Resource Profiles

## NEW CALEDONIA



by

**Eroarome Martin Aregheore**



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## 1. INTRODUCTION

New Caledonia, a French overseas territory in the Southwest Pacific, about 1 500 km east of Australia, is an archipelago of 18 575 km<sup>2</sup> (World Factbook), and consists of one large and one small island, and the Loyalty and Huon groups. The Main Island, New Caledonia is known as La Grande Terre.

New Caledonia belongs mainly to the category of the “Mainlands” which are situated in the Southwest Pacific pre-continental zone and present an ancient volcanic sedimentary substratum with heavy relief and large areas suitable for agricultural development (Doumenge *et al.*, 1988). The territory also includes a number of uninhabited islets such as Huon and Surprise Islands in the D’Entrecasteaux reefs, the atolls of the Chesterfield islands and Bellona reefs, Walpole Islands, Beautemps-Beaupre atolls and Astrolable reefs (Doumenge *et al.*, 1988) – see Figure 1. The islands of New Caledonia lie between 18° and 23° S 163–169° E. The capital Noumea on Grande Terre is about 1 850 km northeast of Sydney. About 68.4% of the population lives in Southern Province and over half of New Caledonia’s population live in metro and greater Noumea.

Since 1969, when the economic boom started, the territory’s population has grown considerably. Three large ethnic groups (Melanesians, Europeans and Polynesians) are represented throughout New Caledonia. The Main Island contained about 90% of the population of 212 000 in 2001 (Crocombe, 2001) and 212 700 in mid-2000 according to SPC. At the last census in 2004 the population was 230,789 and mid-year estimates for 2008 and 2010 according to the latest SPC data (SPC, 2008) are 246 614 and 254 496 with an annual growth rate in the period 2008–2010 estimated at 1.6%. According to the World Factbook (July 2008 estimate) the population is 224 824 with a 1.175% growth rate. Agriculture contributes about 2% of the gross domestic product (GDP), although only 1% of the land is arable. More than one – seventh of the labour force is employed in agriculture. Cash crops include coffee, copra, and coconut palm oil. Potatoes, vegetables and maize are grown commercially while yams, taro and sweet potatoes are grown for subsistence. Yam and taro are the Melanesians’ staple foodstuffs. The small islands rely heavily on coconuts, copra, subsistence crops and fishing.

About three-quarters of the vegetation is unique to the Main islands and is largely drought resistant. The Main Islands have rich mineral deposits of nickel, iron ore, manganese, silver, chromite and cobalt. The reserves of nickel are among the largest in the world. Phosphate deposits occur on some of the atolls and raised coral islands.

Compared to other Pacific Island countries, ruminant livestock production in New Caledonia is high, although local production does not meet domestic demand, so the country still relies on the importation of meat and milk products (Table 1).

Pastures occupy about 15% of the land, and cattle, pigs and goats are raised for domestic needs. Commercial fishing includes aquaculture – shrimps, oyster and trochus -besides sea fishing. Livestock production is both subsistence and commercial. According to the 1991 Agricultural Census there were 125 461 head of cattle in New Caledonia – bullocks, cows, calves and steers. Also there were 16 498 goats, 3 651 sheep, 11 425 horses and 12 523 deer. Among the cattle population few are dairy animals, however, to achieve some level of self-sufficiency in dairy products, three local companies make yoghurt, butter and cheese, from the liquid milk produced by these animals, but their output is insufficient to meet local demand (Marchal *et al.*, 1993). Latest livestock numbers, production and import figures are shown in Table 1.



**Figure 1. Map of New Caledonia**

Source: The World Factbook

**Table 1. New Caledonia statistics for livestock numbers, mutton, milk and beef production, cattle imports and milk, beef and chicken meat imports for the period (1991) 1997–2007**

Item	1991*	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle (,000)	125.5	110	110**	110	110	110	111.3	111	111	100	110	115
Goats (,000)	16.5	11.0	10	10	10	9	8.1	8.1	8.1	8.1	8.1	8.2
Sheep (,000)	3.6	2.9	2.8	2.7	2.6	2.5	2.3	2.3	2.3	2.3	2.3	2.4
Pigs (,000)	29.8	27.4	27.0	26.6	26.2	25.8	25.5	25.5	31.0	31.0	28.5	29.0
Mutton prod. (Mt)	26	22	20	28	20	20	20	20	15	15	10	11
Pig meat prod. (,000 Mt)	1.21	1.38	1.49	1.36	1.41	1.40	1.40	1.40	1.77	1.82	1.97	2.05
Beef prod. (,000 Mt)	3	4	4.1	4.2	3.9	4.1	4	4	4	3.5	3.0	3.1
Total meat prod. (,000 Mt)	4.84	6.16	6.31	6.45	6.12	6.14	6.13	6.32	6.74	6.28	5.89	6.18
Milk fresh, prod. (,000 Mt)	3.8	3.6	3.7	3.7	3.6	2.0	1.5	1.0	0.9	0.8	0.8	0.8
Cattle imports (head)	70	7	47	47	20	20	118	66	14	4	-	n.r
Milk fresh imports (,000 Mt)	3.96	3.61	3.73	3.40	3.10	3.25	3.17	3.20	3.36	3.58	3.64	n.r
Beef & veal imports (,000 Mt)	1.1	0.4	0.3	0.3	0.25	0.2	0.2	0.2***	0.3	0.6	1.3	n.r
Chicken meat imports (,000 Mt)	5.49	5.84	6.39	6.27	5.30	5.96	6.42	6.78	3.85	3.80	3.25****	n.r

\* New Caledonia carried out an Agricultural Census in 1991 so livestock numbers are actual figures from the census (also 12 523 deer were recorded)

\*\* 1998 data contrast with the figures of Macfarlane (1998) 125 000 beef cattle and 1 000 dairy cattle, 4,000 sheep, 17 000 goats and 12 000 deer; data need verifying.

\*\*\* also in 2003 and 2006 imports included 2 725 Mt and 2 511 Mt of dry/cond/& evap. milk, and 519 Mt and 589 Mt of mutton and lamb

\*\*\*\* this in addition to 900 Mt of local production of chicken meat in 2006 and 1951 Mt of eggs

n.r no record; No data for 2008

Sources: FAO on-line statistics; (FAO Database, 2009)

## 2. CLIMATE AND AGRO-ECOLOGICAL ZONES

New Caledonia is subject to the southeast trade winds which moderate the climate; it can be described as oceanic tropical: that is hot and humid without excesses. Average temperature at sea level ranges between 22 °C and 24 °C. Climate Information

Like most South Pacific islands, five main categories of climate are found:

- (1) The tropical climate of the low lying islands, with relatively low and irregular rainfall (1 200–1 800 mm).
- (2) The tropical climate experienced on the windward slopes of the higher islands. It is always very humid with rainfall above 2 000 mm at sea level, more than 5 000 mm at altitude, with a short dry season during the austral winter.
- (3) The tropical climate found on the leeward slopes of the higher islands, where rainfall is concentrated during the hotter periods of the year and is more occasional during the cooler season (1 500–2 500 mm annually) with two short dry seasons (April–June; September–November).
- (4) The 'sub-Mediterranean' climate found mostly in the southerly areas (south of Grande Terre) whose minimal temperatures are very marked frequently below 10 °C.
- (5) The mountain climate found in the inland valleys of Grande Terre where rainfall often reaches 6 000 mm and where mists frequently occur and temperatures could fall below 10 °C.

There is considerable geographic and year to year variation in rainfall patterns in New Caledonia. The Central Range, the axis of which is parallel to the axis of the island, isolates a narrow strip on the East Coast, with abundant rainfall, from the western plains with semi-arid climates. An example of such differences can be seen through the comparison of the mean annual rainfall in Galarino (Northeast): 4 000 mm, and 45 km away, in Ouaco (Northwest): 800 mm. Moreover, on the West Coast, the plains are prone to droughts: evapotranspiration can be over 100 mm/month. In addition, there are considerable variations in annual rainfall, due to the random passage of depressions and cyclones; thus, in Kaala Gomen (North-west) rainfall could vary from 730 mm during a dry year up to 1 650 mm in a wet year (Marchal *et al.*, 1993).

Parts of New Caledonia (e.g. the Loyalty Islands) could also be classified as "low-lying islands" made up of coral masses that have emerged several dozen metres above sea level. New Caledonia Grande Terre is mountainous; the entire upland area is bordered by plains and hills that are narrow on the eastern coast and relatively wide on the western coast. It is on these coastal plains, especially the low-lying alluvial valleys that Melanesians have established their main food producing areas.

### 3. SOILS AND TOPOGRAPHY

There is a wide range of soils, parent rocks and run off features. Drainage conditions are very different on steep slopes (East Coast and Central Range) than on gentle slopes (West Coast and Loyalty Islands). The soils have low fertility, are prone to erosion and are characteristic of mountainous islands influenced by the trade winds. Climatic differences between east and west are the cause of different soil evolution (Marchal *et al.*, 1993).

However, soils on alluvial terraces not contaminated by deposits from mine massifs (a group of mountains with a limited area) are the best in the archipelago. Soils on the basaltic or limestone plains located in the Grande Terre or in the other islands range from average to good and in some places are even excellent due to the presence of pumice stone that floats over from Vanuatu's volcanoes. For details of the main physical units in New Caledonia see Doumenge *et al.* (1988). Also see map.

Ferrallitic or ferritic soils found on ultrabasic rock are of very poor chemical composition and are physically unstable. They are deep, dark red and have a distinct tendency to harden into gravel or ferrallitic crust. In spite of this, it is on this type of soil that most Melanesians, originally from Grand Terre, engage in horticulture, grow coffee trees and to lesser extent rear cattle.

Another type of soil quite unsuitable for agriculture (but an important resource nonetheless) is the mangrove soil found at the mouth of the following rivers, Diahot, Koumac, Voh, Kone, Pouembout, Poya and Foa.

Good quality agricultural land, and the most fertile in Grande Terre, can be identified by its largely unaltered soil formed on recent non-magnesium alluvial deposits from rivers. It is found near the coast, mainly low lying valleys both on the eastern and western sides of Grande Terre. It is here that pure deep soils ideal for open field crops or for growing shrubs are found.

In general, soils in Grande Terre are not very fertile; and often very susceptible to erosion. Regular humidity on the windward coast and high up on the leeward coast causes systematic desaturation of



Figure 2. Map of main physical units in New Caledonia

soils. Soil differences due to climate can be observed. Magnesium is a predominant element, often associated with high concentrations of iron, nickel, chrome and cobalt. The soils are often deficient in phosphorus and sometimes also in potash.

On the West Coast, chloride in the soil water relates to salted areas close to mangroves. Soils are typically shallow but with a crumbly alteration horizon. Clay valleys on the East Coast have 10–30 cm of hydromorphic horizon and often of poor drainage. The majority of soils have a gravel and hyper magnesium pattern, and thus low fertility. Alluvial soils are present too, but they are scattered and prone to flood (Marchal *et al.*, 1993).

On the leeward coast, soil acidity is marked in the dry season. On Grande Terre, a contrast exists between the windward slope (eastern coast) whose soils are deep and often very acid and the leeward slope, whose soils are fine and have quite a good chemical balance. The most obvious disadvantage of most New Caledonia soil types is that they lack chemical balance due to their ultrabasic origin. Generally, the climatic differences between east and west are the causes of different soil evolution.

An agro-pedological inventory drawn up for the Grande Terre indicated that 30 000 ha were regarded as suitable for open field crops or plantation crops; 180 000 ha for pasture land; 960 000 ha for afforestation; and that 505 000 ha should be left in natural vegetation in view of their extremely poor quality and very steep slopes.

## 4. RUMINANT LIVESTOCK PRODUCTION SYSTEMS

Beef cattle production is the main industry and features very well in New Caledonia history. However, there are other livestock such as horses, goats, sheep and deer (whose meat is exported to Japan). Two livestock production systems (smallholder and commercial) are practised in New Caledonia. Cattle rearing occurs in all the western coastal plains and in some valleys of the eastern coast and this has often taken the place of pre-European horticulture. Most of the cattle are on European ranches while others are in Melanesian reserves. According to the 1991 livestock census there were 2 125 (cattle) stations, with 125 461 head of cattle. Since then there has been only a marginal increase in the number of cattle, 126 000 head of cattle (125 000 beef and 1 000 dairy) according to Macfarlane (1998) and a decline according to the FAOSTAT data in Table 1. Seventy percent of the farmers have less than 50 head (smallholder) and only one percent have 500 or more (commercial).

Meat is the dominant output and fewer than 5% of the cattle are dairy cows (only 1 000 head according to Macfarlane, 1998). The predominant breeds of cattle are the Limousin, Charolais and Santa Gertrudis. Local production of beef as at 1992 was estimated at 3 220 tonnes and a kilogram was sold for 340 FCFP. Sale prices have increased since then but production levels have not risen as much as would have been expected. Of the total beef consumption of 4 021 tonnes recorded in that year, import of beef accounted for 19% (801 tonnes). Of these imports, 85% are frozen or refrigerated carcass and 15% are processed food. The cattle industry is controlled by OCEF (Office de Commercialisation et d'Entreposage Frigorifique: office for marketing and frozen storage) that was created in 1963. The OCEF has a slaughtering capacity of 5 000 tonnes/year and the abattoir can process up to 1 000 tonnes/year. The frozen storage capacity is only 75 tonnes.

CIRAD (Centre de coopération internationale en recherche agronomique pour le développement) is carrying out research and development among others in the following areas in New Caledonia.

- the monitoring of three networks of reference farms for cattle, Rusa deer and small ruminants;
- genetic improvement of Charolais cattle, support for cattle breeders and small ruminant breeder professional organizations;
- the establishment of pest control (especially for ticks) (Bourzat, 1991);
- to increase feed availability to achieve all year round feeding, new hardy, drought-tolerant fodder grasses and legumes have been introduced to the ruminant producing areas covered by the CIRAD network of test farms in New Caledonia.

CIRAD has set up a network of 29 sample farms in the northern province, as part of a project to improve dairy cattle production in New Caledonia, and this has helped to improve the situation since

1993. For example, mean calving rates, which were lower than 50% in 1993, rose to about 65% in 1995 on farms with more than 200 head of livestock.

Also on the east coast of New Caledonia, the awareness of improved livestock management techniques has increased from 5–15% of livestock farmers in 1992 to 25–35% in 1995 (CIRAD, 1995).

Studies on the evaluation of rangelands for grazing ruminant livestock in New Caledonia are also being carried out by CIRAD. Also, CIRAD-EMVT has accepted to test in New Caledonia, fodder plant varieties that were bred in Australia. All these are aimed at improving the nutritional level of grazing livestock in New Caledonia. Bregeat, (1985) reported that steers offered green grass (*Panicum*, *Sorghum* and *Brachiaria*) every day and chopped fresh cassava roots with young *Leucaena* branches have daily liveweight gains of between 739–888 g/head/day. This indicates that well balanced diets for fattening steers could easily be produced with available green forages in New Caledonia.

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

Due to natural conditions, i.e. mountains and infertile mined land, the area actually used for agricultural production remains under 15% of the total area available in the territory. Grazing accounts for 93% of this figure and is typically an activity of the west, where farmers have to cope with a semi-arid climate. The difference in the farming systems is a reflection of the land tenure system in place in New Caledonia. For example, 90% of farmers use only 6% of the land. A few farms are over 150 ha and these are about 1% of the number that account for 35% of the land use. Pasture development in New Caledonia is hampered by many constraints and among these are:

1. the poor soil types that prevail in some parts of New Caledonia;
2. harsh weather conditions are sometimes experienced (an example was the drought of 1992/93); and droughts occasionally occur especially on the drier western sides of islands;
3. the problems of the land tenure system that make it difficult to acquire land for agricultural purposes;
4. given the climatic conditions, fodder production is seasonal. The fodder growth period is short, only four months from January to April. The monthly and inter-annual variations especially in the north, are constraints to rigorously planned fodder provision;
5. the nickel boom has been an alternative attraction for economic activity;
6. importation of consumer goods;
7. natural conditions are not particularly good for cattle raising.

## 6. THE PASTURE RESOURCE

### 6.1 Current resources

According to Marchal (1997) grazed pastures in New Caledonia fall under three categories - open pastures (217 000 ha), under coconuts (3 000 ha) and under trees (2 000 ha). Of the total land area available nearly 220 000 ha are under natural or improved pasture and this accounts for the feeding of 170 000 ruminants (125 000 beef; 12 000 horses; 16 000 goats, 4 000 sheep and 13 000 deer) (Marchal, 1997). There are only 160 ha for fodder and artificial pastures; 37 200 ha of improved pastures (sown and managed), or 17% of the surface always under grass (Marchal, 1997).

Tilled and fertilized pastures account for 56% of the area. In areas with low fodder content native pastures represent 56 000 ha or 27% of the fodder potential of the territory. Due to the short fodder growth period, the agricultural services promote the provision of fodder supplies through subsidies and technical backup (green sorghum, hay and silage) (Marchal *et al*, 1993).

Besides the above, other features of the vegetation of New Caledonia include conifers (*Pinus* spp.) that dominate in the higher elevations and give way to beech forest with lianas and bush (*Cordia subcordata*;

*Acioa barteri*; *Vigna marina*; *Triumfetta*). Also in the drier parts of the western coast, Niaouli or Cajeput trees (*Melaleuca quinquenervia*) and savanna like grassland [*Indigofera endecophylla*; *Heteropogon contortus*] occurs, while mangroves (*Bruguiera conjugata*, *Robinia pseudoacacia*) are found in swampy coastal areas.

*Leucaena leucocephala*, called 'Mimosa' in New Caledonia, can be found on wide areas especially on basaltic hill soil ; and it has been observed that *Leucaena* forage presents no toxicity problems for beef cattle in New Caledonia (IEMVT, 1983), therefore this could be extensively used with other forages in grazing programmes.

## 6.2 Improved pasture grasses

It must be emphasized that all cattle in New Caledonia are grazed on more or less improved pastures which accounts for about 44% of the nature pastures. There are no feedlots (Bregat, 1985) and the availability and quality of beef depends mostly on the season of the year. It has been observed that it is difficult to find good quality beef during the cold and dry seasons because of the unavailability of suitable good quality pasture.

However, in order to improve the quality or replace available natural pastures several grasses have been introduced into New Caledonia over the years. Among such are green grass[Guinea] (*Panicum maximum*), Pará grass (*Brachiaria mutica*), signal grass (*Brachiaria decumbens* cv. Basilisk) and sorghum.

## 6.3 Improved legumes

To improve the nutrient content and palatability of the improved grass varieties, it is imperative to have legumes that can be used in a grass/legume mixture. The improved legume varieties found in New Caledonia are *Centrosema pubescens* cv. Common (Centro); *Pueraria phaseoloides* (Puer), *Stylosanthes guianensis* cv. Endeavour (Stylo); *Vigna luteola* (Vigna); *Desmodium uncinatum* (Silverleaf); *D. heterophyllum* (Hetero); *Macroptilium atropurpureum* cv. Siratro (Siratro) and *Glycine wightii* cv. Tinaroo (Glycine). It has been reported that well balanced diets for fattening steers can be produced with green forages from *Leucaena* and cassava leaves (Bregat, 1985).

## 6.4 Weed control

Weed control in New Caledonia is carried out using either of the following methods:-

- slashing with a mower attached to a tractor,
- use of herbicides,
- manual removal of weeds, and
- using ruminant livestock to graze under coconut plantations.

## 6.5 Recent initiatives in forage improvement

- (1) Incorporating self-regenerating legumes into naturalized grass fallow to improve the restoration of soil organic matter and soil nitrogen levels.
- (2) Selection of shrub varieties that can be grazed by cattle.
- (3) Over-sowing of legumes and analysis of the cultivated ones for nutrient levels and examine the effect of species used for improvement purposes.
- (4) Forage intensification techniques: combinations of grasses and legumes, selection of plant species tolerant to nitrogen deficiency and inoculation of legume seeds before planting with the appropriate nitrogen-fixing bacteria (rhizobium).
- (5) Development, rehabilitation and use of degraded zones.
- (6) Provision of technical innovations for livestock farmers.
- (7) Teaching farmers the technical know-how on the improvement of the sanitary conditions of herds and flocks.
- (8) The optimization of feed and forage resources through the conservation of surplus as hay or silage for future use or during the period of scarcity (Macfarlane, 1998).
- (9) Livestock raising being backed by large subsidies with the aim of promoting investment.
- (10) The introduction of zero-tillage methods in pasture establishment.

## 7. RESEARCH AND DEVELOPMENT ORGANIZATIONS AND PERSONNEL

- (1) Marchal, V., Desvals, L., and Mercier, P.,  
CIRAD/E.M.V.T.,  
Païta, New Caledonia.
- (2) Tuyienon, R.,  
CIRAD/E.M.V.T.,  
Province Nord, New Caledonia
- (3) Thierry Mennesson,  
CIRAD-EMVT, station de Port-Laguerre, New Caledonia.  
CIRAD in New Caledonia

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### Websites

New Caledonia  
CIRAD in New Caledonia  
Work to be taken over by Institut Agronomique Néo-Calédonien (IAC)  
World Factbook

## 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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