

**Improving the management of dairy production systems in  
Cameroon**

**by**

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Philosophiae Doctor

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## **DEDICATION**

To my dear wife Judith who has supported me during this work in a special way. To my children: Longè, Charles-Dimitri, Anwarite, Lipem and Beau.

To my brothers nicknamed Baba, Type, Vieux and sister Aimée. Lastly to my parents without whom I could not be what I am today: Bayemi Charles and Ngo Pougue Marthe.



## DECLARATION

I declare that this thesis for the degree of Philosophia Doctor (Faculty of Agriculture, department of Animal and Wildlife Sciences) at the University of Pretoria has not been submitted by me for any degree or exam at any other university.

Signature.....

A handwritten signature in black ink, consisting of several overlapping loops and lines, positioned over the dotted line for the signature.

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<b>AI:</b>	.....	Artificial insemination
<b>BCS:</b>	.....	Body condition score
<b>C-ELISA:</b>	.....	Competitive Enzyme Linked Immunosorbent Assay
<b>CL:</b>	.....	Corpus luteum
<b>ECM:</b>	.....	Energy Converted Milk
<b>ELISA:</b>	.....	Enzyme -Linked Immunosorbent Assay
<b>EOS:</b>	.....	Economic Opportunity Survey
<b>FAO:</b>	.....	Food and Agriculture Organization
<b>FMD:</b>	.....	Foot and mouth disease
<b>GDP:</b>	.....	Gross Domestic Product
<b>GLM:</b>	.....	General linear models
<b>HPI:</b>	.....	Heifer Project International
<b>IAEA:</b>	.....	International Atomic Energy Agency
<b>ILCA:</b>	.....	International Livestock Centre for Africa
<b>ILRI:</b>	.....	International Livestock Research Institute
<b>IMVT:</b>	.....	Institut de Médecine Vétérinaire des pays Tropicaux
<b>IRAD:</b>	.....	Institute of Agricultural Research for Development
<b>IRZ:</b>	.....	Institut de Recherche Zootechniques
<b>lsmeans:</b>	.....	Least square means
<b>mAb:</b>	.....	Monoclonal antibody
<b>MINEPIA:</b>	.....	Ministère de l'Élevage, des Pêches et des Industries Animales
<b>MINPAT:</b>	.....	Ministère du Plan et de l'Aménagement du Territoire
<b>MPT:</b>	.....	Multipurpose trees
<b>ng</b>	.....	Nanogrammes

<b>nmol</b>	.....	Nanomoles
<b>NGO:</b>	.....	Non-Governmental Organization
<b>OIE:</b>	.....	Office Internationale des épizooties
<b>PDA:</b>	.....	Potato-dextrose agar
<b>PRA:</b>	.....	Participatory Rural Appraisal
<b>RIA:</b>	.....	Rradioimmunoassay
<b>S-LPS:</b>	.....	Smooth lipopolysaccharide
<b>SPCA:</b>	.....	Standard Plate Count Agar
<b>TBC:</b>	.....	Total bacterial count
<b>TDCS:</b>	.....	Tadu Dairy Cooperative Society
<b>USAID:</b>	.....	United States Agency for International Development
<b>VRBA:</b>	.....	Violet red bile agar

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## SUMMARY

- Title:** Improving the management of dairy production systems in Cameroon
- Candidate:** Bayemi Pougue Henri Dieudonné
- Supervisor:** Prof E.C. Webb
- Department:** Animal and Wildlife Sciences
- Degree:** Philosophiae Doctor

This work was carried out with the objective of improving dairy farms in Cameroon using an integrated method. Research done in the area on milk production in the country was reviewed. A participatory rural appraisal was conducted in dairy farms of the North West Region of Cameroon. An economic opportunity survey was carried out on 61 dairy farms in the same region. Interventions aimed at solving main constraints were planned. An on-farm study on the effect of feed supplementation before calving on milk production, ovarian activity and calf growth of Holstein, indigenous Red Fulani cows and their crosses was conducted. Corresponding blood samples were analyzed using ELISA Progesterone kits. Animal health studies involved screening for *Brucella abortus* antibodies in 21 villages by ELISA. Partial budgeting was used to evaluate the financial impact of interventions.

Results show that five small scale dairy production systems are found in the region: transhumance, improved extensive, semi intensive, zero grazing and peri-urban. Main constraints to dairy production include in order of importance: poor marketing opportunities and long distances to market, limited grazing land and poor supplementation of cattle, limited health control, inadequate knowledge in processing, conservation and storage of milk, poor

reproductive management and prolonged calving interval, lack of water in the dry season, poor housing, poor organization of group, limited number of dairy cows and poor record keeping. Milk production per cow on-one-day and average calf production interval account for the greater part of economic opportunity. A human progesterone ELISA kit was validated for use in cattle. *Brucella* screening showed a general seroprevalence of 8.4%. It is recommended that infected cattle should be slaughtered. A specific control programme should be organized and an effort should be made to determine the causes of the spread of brucellosis. A regular *Brucella* testing should be instituted. Farmers adopting interventions had returns of 193 and 232% without and with opportunity costs proving the positive impact of interventions using the integrated method. These interventions need to be spread to more farms in the country.

The integrated method was proven to be effective in ensuring improvement of dairy systems in Cameroon. This method needs to be adopted for further dairy production improvement by the creation of multidisciplinary intervention teams and the training of integrated intervention specialists in the dairy sector.

**Key words:** Cameroon, Integrated method, Interventions, Small holder dairy