



# Farming Systems Design 2007

An International Symposium on Methodologies on Integrated Analysis on  
Farm Production Systems

## Farm-regional scale design and improvement

September 10-12, 2007 – Catania, Sicily, Italy

*sponsored by*



LA GOLIARDICA PAVESE

The correct citation of articles in this book is:

*authors*, 2007 *title*. On: Farming Systems Design 2007, Int. Symposium on Methodologies on Integrated Analysis on Farm Production Systems, M. Donatelli, J. Hatfield, A. Rizzoli Eds., Catania (Italy), 10-12 September 2007, book 1 - Farm-regional scale design and improvement, pag. ??-??

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**Sponsors of the Symposium:**

The University of Catania  
The Società Italiana di Agronomia

**Under the auspices of:**

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ISBN 978- 88-7830-472-7

Printed on August 2007 by *Global Print*, Gorgonzola (MI), Italy

## Foreword

The Farming Systems Design Workshop is the result of a joint effort among the American Society of Agronomy (ASA), the European Society of Agronomy (ESA), and the International Environmental Modeling and Software Society (IEMSS). This meeting is a result of the joint efforts between ASA and ESA to promote more interaction between the agronomic societies and we are fortunate to have the interest of IEMSS as a partner in this effort on Methodologies for Integrated Analysis of Farm Production Systems in this inaugural effort. We are deeply appreciative of the offer from the University of Catania, Faculty of Agriculture, and the [Società Italiana di Agronomia](#) to provide the venue for this meeting.

There is a growing interest in agricultural systems that serve multiple purposes, in the context of driving factors such as climate change, liberalization, environmental concerns, and changing agricultural institutions. Farming systems are continuously being pressured to innovate and change to meet a variety of ecosystem services. The drivers strongly affect agricultural and environmental policies, as these must support the sustainability of agricultural systems and their contribution to sustainable development in general. This places a demand on research approaches that enable analysis of current farming systems, exploration and design of alternative ones as well as new co-learning and dissemination strategies. These research approaches must provide capabilities for assessing the economic, environmental and social aspects of farming system's evolution in different spatial and temporal contexts. Today, a variety of quantitative and qualitative methods exist, but there is a lack of integration in evaluating issues which range from strictly technical to social, and to landscape related attributes. Our for this symposium are to: 1) Provide an opportunity to integrate knowledge across disciplines targeted at farming system analysis, design and innovation; 2) Compare approaches being used/developed in different research groups; and 3) Identify the available operational tools and the future research needs.

We hope to integrate across biophysical and social domains using quantitative and qualitative approaches from the developed and developing world because we believe there are valuable lessons to be gained from many different perspectives.

Farm-regional scale design and improvement, involves considerations operating at whole farm scale, such as trade-offs between economic, environmental and social aspects of farm operation; interactions with policy, community, landscape, and markets; action research and participatory methods; adapting to climate change; crop-livestock integration. Field-Farm scale design and improvement involves issues operating at field scale, such as optimising production systems, novel systems, production system sustainability and externalities, tools, participatory research. These will be discussed through plenary, oral, and poster sessions covering each of the topics shown in the program.

This effort would not be possible without the dedication and enthusiasm provided by the Scientific Committee. We are indebted to the following individuals for their service on the Scientific Committee.

- John Antle, Montana State University Bozeman, USA
- James Ascough, ARS Fort Collins, USA
- Salvatore Cosentino, University of Catania, Italy
- Olaf Christen, University of Halle-Wittenberg, Germany
- Marcello Donatelli, CRA-ISCI, Italy
- Carlo Giupponi, University of Milan, Italy
- Jonathan (Jon) Hanson, USDA-ARS-NGPRL, USA
- Graeme Hammer, University of Brisbane, Australia
- Jerry Hatfield, USDA-ARS-NSTL, USA
- Thomas Heckeley, Bonn University, Germany
- Brian Keating, CSIRO, Queensland, Australia
- Hans Langeveld, Wageningen University, The Netherlands
- Keith Matthews, Macaulay Institute, Scotland
- Andrea Rizzoli, IDSIA-USI/SUPSI, Switzerland

- Claudio Stockle, Washington State University, USA
- Martin van Ittersum, Wageningen University, The Netherlands
- Jacques Wery, UMR System (Agro.M-Cirad-Inra), France

Most of all we express our appreciation to the participants in this symposium and your willingness to share your information for this meeting. We look forward to the fruitful interactions during and following this meeting as we begin to share your thoughts and ideas on how to improve farming systems.

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## A RESEARCH APPROACH FOR THE ANALYSIS OF LIVESTOCK DYNAMICS INTERACTING IN MARKET FORCES

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### Introduction

In North Cameroon, the current status of cattle breeding is illustrative of the studies that showed that extensive farming often evolves under pressure such as the lack of resources (Cochet, 2001; Tiffen *et al.*, 1994). To meet challenges raised by the shortage of pasture land, livestock farmers elaborate defensive strategies (settlement, reduction of the herd, diversification of activities) which are alike to those observed in West Africa where the phenomenon is already underway. The defensive strategies of farmers are well known, but there is a lack of knowledge about their responses to the development of market, caused by the increase of external beef demand (Nigeria) and particularly local demographic trends: the growth rate is + 2.8% per year in north Cameroon, and the population of Garoua, the main provincial town, is actually estimated at 370,000 inhabitants will possibly double within 15 years.

It has been found that, when conditions are favourable, farmers modify their practices to respond to opportunities generated by good market trends (Cour, 2000). The support of this innovative capacity, which is seen as one of the main operational levers to meet the challenge of food security, raises two important questions: 1) what is the impact of market on livestock farmer's practices? 2) how does the evolution of livestock in the above context influence beef supply? This communication presents a methodological approach for the study of livestock dynamics interacting in market forces.

### Methodology

The systemic and contextual nature of this research suggests the designing of an appropriate approach. This approach was organized around three axes: territory, market channel and time. The territory entry makes it possible to consider cattle rearing as a technical act constrained by the farmer's projects and the characteristics of the environment. This entry is a tool to appraise the local farming conditions and to approach the diversity of livestock farming systems (pastoral, mixed-farming, cattle-fattening in the urban area). The market channel approach puts farming as a constituent of a chain whose various components have functional links. It helps to identify the demand, analyse and understand the strategies of stakeholders who intervene in response to this demand. The Time axis is used to evaluate adequacy between demand and supply.

Beyond the specific contribution of each axis, this methodological process is focussed on understanding the interactions that exist between these three axes. Thus, the analysis of the exploitation and marketing practices of livestock farmers help to appraise the effect of market on livestock dynamics, whereas the study of beef supply throw more light on the action of livestock on market. Time assists to apprehend the seasonal variations and to carry out short and long term projections, thus highlighting the issues of food security and farm sustainability.

To investigate the various axes, surveys and follow-ups related to the practices and strategies of the various classes of stakeholders were carried out: 60 farmers (25 pastorals, 20 mixed farming, and 15 cattle fattening units in the urban area), 10 dealers, 20 tradesmen, 36 butchers and 300 consumers. An annual follow up was carried out at the level of the herd, farm, cattle market and the municipal slaughter-house.

### Results

Unlike the mono-disciplinary approach, the systemic process makes it possible to apprehend at the same time market trends, livestock dynamics and the relationships between these two phenomena. Effects of market on breeding practices vary according to farming systems (Tab 1). Most farmers modify their renewal and exploitation practices to benefit from market opportunities (level 1). Farms that show characteristics of levels 3 and 4 are mostly emergent systems with a net

economic goal. They have high production costs and need to plan their sales in order to avoid competition from extensive farmers who are mostly found in level 1.

**Table 1. Evolution of farmer's objectives and practices under market influence**

Influence of market	Effects of the market	Characteristics	Farmer objectives
	<u>Level 4.</u> Management and contractual arrangements (15%, n=9)	Creation of farmers organisation, contracts with other stakeholders	Realize economies of scale, Better bargain with stakeholders
	<u>Level 3.</u> Transformation of the farm structure (30%, n=18)	Development of cattle fattening and milk production activities Splitting up of herds	Have a the return from the exploitation of the economic function of livestock
	<u>Level 2.</u> Improvement of breeding practices (47%, n=28)	Improvement of feeding health follow-up of livestock Good body status of livestock	Improve conformation and technical performance of cattle to gain higher margin at sales
	<u>Level 1.</u> Modification of renewal and exploitation practices of herds (65%, n=40)	Increase and planification of the sales of cattle Increase of the renewal rate of the herd	Earn a higher profit from cattle sales without additional investments/changes

( ): percentage and number of farms found at this level

To a certain extent, the diversity of adaptations found, matches the different stages of an increasing farm market linkage process: from levels 1 to 4, the economic function of cattle predominates progressively over its social role. This trajectory observed in very few pastoral farms with offensive strategies (15%) is neither linear nor valid for all farms. It rather shows that to obtain full benefit from opportunities raised by market trends, a minimum transformation of the farm and farming practices is necessary. Despite the attractiveness of the market, the pastoralists, who are currently preoccupied by the sustainability of their farms, still hesitate to modify the structure and functioning of their farms. The fact that the market leads them to early reform their "good old cows" and to replace them by heifers can in the long term generate an improvement of the productivity of their herds. Almost all the farmers (90%, n=55) diversify their activities to minimise effects of price variation and market demand.

This approach also shows that the status and evolution of livestock influence the functioning of market channel. Local farms contribute 45% of the beef supply in Garoua where beef consumption is estimated at about 9.3 kg per capita. The complement is comes from Chad. During transhumance and arrival of Nigerian tradesmen, supply on the market drops to about 30%. Supply also varies qualitatively due to the career management practices on cattle. The diversity of farming systems helps to reduce these seasonal fluctuations. Comparison between supply and demand shows a deficit of 15% (540 tons), which, according to projections', will double in the next 10 years if suitable measures are not taken. In the context, characterised by deficiency in supply and a weak requirement for quality, the prevalence of the extensive farming systems, whose production vary, and often of poor quality (thin and sick animals), are always bought by the low income populations.

### Conclusion

The approach designed makes it possible to appraise determinants and patterns of interactions between market trend and livestock dynamics. These interactions which are necessary to equilibrate demand and supply are constrained by the context (purchasing power, lack of pasture lands, influence of Nigeria) and especially, by dynamics peculiar to market and livestock. Results obtained show that this approach could be further completed into a model usable for the development of livestock and food security policies. The analysis of farmer's strategies in relation to those of other stakeholders of the market channel highlights that insertion in markets requires the improvement of the bargaining, management and organisational skills of farmers.

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