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To cite this version:
Claire Mosnier. Suckler beef systems in France: evolution, future prospects and challenges regarding GHG emissions. Seminar on sustainable livestock production systems on grazing, May 2015, Paris, France. 3 p. hal-02739733

HAL Id: hal-02739733
https://hal.inrae.fr/hal-02739733
Submitted on 2 Jun 2020

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Suckler beef systems in France: evolution, future prospects and challenges regarding GHG emissions.

Suckler beef systems are an important feature of French agriculture. Indeed the 4 millions French suckler cows\(^1\) represent more than one third of all European suckler cows and supply around 65% of the beef production in France (France is self sufficient in beef meat). 70% of the 97000\(^1\) suckler cow farms sell culled cows and weanlings. Around one million weanlings are exported from France each year, mainly for a finishing in the Po Valley, in Italy. The national beef herd is composed of various pure breeds. The Charolais breed accounts for nearly half of Suckler Cows\(^1\). Next are Limousin (23%), Blonde d’Aquitaine (12%), Salers (5%) and Aubrac (4%)\(^1\). These breeds are maintained as regional particularities and are an asset for marketing. More than 80% of animal diets come from grass grazed (50%) or harvested\(^1\). Consequently, these systems predominate in grassland areas and are located mainly in the Massif Central (43% of suckler cows in 2011: source BDNI). The French beef sector plays a key role in rural development and tourism of least favoured areas such Massif Central and helps in maintaining these large areas under grassland which favours biodiversity, limits pollution and erosion and stores carbon.

The prospects regarding suckler cow outlets are uncertain. The demand for meat is expected to increase in the long run as the world's population increases (over 9 billion in 2040) but for the next decade, the drop in demand for weanlings from Italy (currently, 70% of weanlings are exported to Italy) and increased competition from Eastern European countries are likely to reduce the export market for weanlings. In addition, the number of suckler cows doubled between 1984 and 2000, after the introduction of milk quotas. With the abolition of milk quotas, the contrary process might be observed. Low income and high public support dependency (net income: 13k€/ worker unit, subsidies: 32 k€/ worker unit based on 2013 FADN data) are also important weaknesses of these systems. To keep or improve their market share, suckler cows farms would need improve their competitiveness and profitability.

Environmental concerns are growing. A major issue is climate change. Since the creation of the Intergovernmental Panel on Climate Change (IPCC) in 1988, number of scientific reports have alerted on the major role played by greenhouse gases (GHG) released in the atmosphere on global warming. The objective of the French government is to reduce by 75% GHG emissions in 2050 relative to 1990. Ruminant livestock systems are major producers of GHG emissions including methane. According to the Citepa (2013), the cattle sector accounts for 60% of the French agricultural sector emissions, i.e. 10% of national emissions.

To improve farm income, competitiveness, and to reduce GHG emissions, the efficiency of the production process should be improved. However, over the last decades, the reduction of GHG emissions per kg of meat produced has been small. Veysset et al. (2014a) and Dakpo et al (forthcoming) analysed the evolution of production efficiency at farm level based on a panel of farms located in the North of Massif Central, collected over the period 1980-2012 (>3000 observations). They emphasized that the production of meat per farm have more than doubled while the number of worker units per farm remained constant. This gain was obtained thanks to an increase in herd size and forage area per farm (+180%) but above all thanks to an

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increase in intermediate consumptions (+240%). These intermediate consumptions encompass the costs of concentrate feed and purchased fodder, materiel and building depreciations, fertilizers, fuel, services etc. An important substitution between labour and intermediate consumption occurred (more machinery and equipments, simplified herd feeding practices etc.). Farm size per worker unit has indeed long been a key determinant of farm income, above all by the subsidy income recoverable (Veysset et al., 2014b). However, this correlation has become weaker in recent years resulting from higher input prices, increasing costs from machinery and fuel and a slight reduction of cow reproductive performance. Farmers have now higher incentive to improve efficiency of intermediate consumption. GHG emissions per kg of meat has decreased as meat production per livestock unit increased: from 16.1kg CO₂eq/kg meat (live) without accounting for carbon storage in 1981 to 14.9kg in 1990, to 14.4 kg in 2013. 60% comes from CH₄ (80% enteric fermentation, 20% dejections), 25% from N₂O (fertilization), 15% from CO₂ (fossil energy and indirect emissions) (Veysset et al., 2014c). To simultaneously account for the different production factors and products (meat and GHG), a data envelopment analysis was performed. Dakpo et al (forthcoming) show that for a given combination of production factors, eco-efficiency had increased slightly (+4%) over the period 1980-2013. This gain is explained by the increase in meat production per livestock unit.

Low production efficiency could be explained by risk management since farmers could opt for use less efficient but more resilient production options. An analysis of 1,535 farm observations over the period 2000-2009 (Mosnier et al., 2014) emphasize for instance that the current production systems (economic results) are resistant to variation of grass harvested per livestock unit above -20% relative to average values and that lower level of meat production per hectare reduce gross margin variability (Mosnier et al., 2010);

INRA Reasearch are carried out at different levels to find out solutions that would reduce cattle GHG emissions. First methanogenesis linked to enteric fermentation is studied in vitro thanks to molecular biology. Popova et al (2011) demonstrate for instance that defaunation or flax supplementation reduce the methanogen activity of microbes. Experimental facilities have been developed to measure methane emission in vivo (SF6 tracer techniques for outdoor measurements, special rooms for indoor measurements). Accessible indicators of methane production are tested such as milk fatty acids. In the case of flax supplementation, some fatty acid of milk predict accurately CH₄ emissions (Ferlay et al 2009). To strengthen research on the identification and validation of indicators of enteric methane production in ruminants, an innovative approach for the co-construction of a research program between INRA and ten private partners is built up. Emissions have to be reduced at the animal level but also at higher levels taking into indirect emissions. Thanks to life cycle assessment, Nguyen et al, 2010 demonstrate for instance that the effect of flax supplementation on GHG emission is not significant anymore. Within the Gesebov project coordinated by Idele (livestock institute), a bioeconomic farm model is developed (Mosnier et al, forthcoming) to run prospective scenarios regarding animal and GHG production by 2035 for main cattle French farm types.

References


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