

Flexibility of suckler cattle farms in the face of uncertainty within the beef industry: A proposed definition

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Summary

The aim of this study, carried out in association with stakeholders in farming development, is to explore the capacity of farms to adapt, from a techno-economic point of view, to both structural changes in consumer demand for beef products and recent market disruptions (sudden drop in beef consumption due partly to media coverage of new cases of mad-cow disease, industry paralysis during the foot-and-mouth crisis of winter 2000/2001,...)

The flexibility concept was adopted in order to examine how farms reacted to the winter 2000/2001 crisis, and was based on several technical and economic surveys. A series of variables is proposed and several hypotheses formulated regarding their respective impact on cattle farm flexibility. Five groups of farms have been identified using different combinations of the degree of importance of these variables, with technical, economic and marketing flexibilities specific to each group. Analysis of results has revealed the different combinations of flexibility types possible (technical, economic, marketing) and thus explains why cattle farmers reacted as they did.

Techno-economic analysis of farm flexibility also reveals situations where these technical, economic and marketing flexibilities are complementary, or on the other hand, are incompatible. For traditional livestock farmers, high flexibility from both technical and economic points of view allowed them to weather the crisis unscathed. In other cases, low flexibility either induced inertia, or led farmers to react by seeking solutions outside the cattle farming system. Only farms in which incompatibility between high technical flexibility and low economic flexibility was observed, reacted by changing the production system. Flexibility can be an indicator allowing stakeholders in farming development to pinpoint and predict necessary action.

Introduction and socio-economic context

Adaptation of cattle production farms to uncertainty in this industry is a major challenge for farm sustainability and consequently for maintaining ecological, economic, and demographic equilibrium in the Charolais suckler cattle area in Burgundy, France. Changes in consumer demand for beef products¹, the CAP reform and successive crises in 1996 and 2000, have contributed to market disruption, thus rendering vulnerable or even at times imperiling farms specialized in the production of Charolais beef

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¹ It is not the aim of this paper to study changes in beef consumption practices, but two important trends in consumer habits can be recalled: i) progressive on-going decrease in beef consumption due to changes in consumer habits and to nutritional guidelines (Combris, 1996); ii) increase in consumer requirements for product quality and safety, particularly since the mad-cow crisis of 1996.

cattle. Two crises during the winter 2000/2001², revealed the vulnerability of the Charolais beef production system, and caused a major turnabout in awareness on the part of the different stakeholders involved (farmers, sales intermediaries, development agents responsible for giving technical back-up and advice to farms...) convincing them of the necessity to transform the industry, both for production organization and animal marketing. This crisis was also for the chance for local authorities to reiterate their support for diversification of livestock farmer product lines, and specifically, for the development of cattle fattening and involvement of livestock farmers in official quality sub-sectors³. It is a fact that the Charolais system is currently experiencing difficulties in adapting its products to market demand, in terms of adjusting product volume by category and by quality, but also in terms of informing consumers of the quality of their products. This difficult and slow adaptation can be explained by numerous historical and/or cultural factors. Livestock farmers of the Charolais suckler cattle area have not felt the need to improve industry coordination because they drew their strength from the intrinsic and well-renowned quality of their products, as well as their extensive production practices⁴. Nevertheless, since 1996, a few attempts to adapt have been undertaken and have in particular taken the form of a multitude of management initiatives in quality sub-sectors, often poorly coordinated and at times competing with each other. The limitations of these different measures were revealed by the winter 2000/2001 crisis, and the farmers reacted in different ways and to different degrees, which contributed in the medium term (specifically during the following campaign) to deregulating the market even further⁵. Thus, we consider that the steps taken and the signs given by farms during this crisis reveal either the vulnerability of certain types of farm, or the resilience of others. These factors would appear to be good indicators of the attempts made by farms to adapt to market uncertainty since 1996. This uncertainty, plus the technical and economic situations in which farms specialized in cattle production find themselves today, justify the search for solutions aiming to increase farm flexibility.

The objective of this paper is firstly to define the flexibility concept, as well as other connected concepts, and to justify the use of these concepts in reporting on the production processes used in suckler cattle farming. Techno-economic determinants affecting this flexibility are then proposed. In the first section, we define the flexibility concept and present various technical and economic variables that can define it. In the second section, we present various types of flexibility, as a result of a corresponding factor analysis (CFA) carried out on the techno-economic variables observed in a sample of 14 farms specialized in beef production. We will give our observations as to how these farms reacted during the winter 2000/2001 crisis as compared with the theoretical types of flexibility defined in this section. Lastly in the conclusion, we will give a few indications concerning the difficulties that stakeholders in development confront in supplying advice and taking action in a crisis situation, given the difficulty in determining the nature and degree of farm flexibility.

² Two successive crises affected the beef industry during the winter 2000/2001 : the second mad-cow crisis then the foot-and-mouth crisis which necessitated the adoption of health measures prohibiting animal movements and thus imperiled the farms specialized in lean cattle destined for export to Italy.

³ Several reports including the Delaunoy Report (1998) requested by the Chamber of Agriculture in Saône-et-Loire, France, and the Mordant Report (2000) requested by the Ministry of Agriculture, Forestry and Fishing, emphasizing the necessity of developing animal fattening.

⁴ See Cavailhès J. (1986), Soufflet (1989) for a presentation of the organizational specificity for production and marketing of Charolais beef compared to other breeds.

⁵ The winter 2000/2001 crisis, with the halt in exports to Italy of store animals, caused grave difficulties during that campaign in terms of market outlets for "birthing" farmers who had not yet sold their animals. These difficulties had repercussions during the following season due to an increase in the proportion of fattened animals.

Section I Farm flexibility and market uncertainty

1. *The flexibility concept in farming*

Unlike other concepts frequently used to define and/or explain changes in farming : change, adaptation⁶, development, sustainability, resilience⁷,..., flexibility as a term is not (to our knowledge) often used in agricultural research. It is nevertheless associated to a greater or lesser degree with all these notions, and given the conceptual and associating connotations that we attribute to this term, the use we make of it needs to be justified and defined. In our research programme “Farm flexibility confronted with beef crises”⁸, we consider flexibility to be the **capacity of the livestock system to adjust quickly to a wide range of economic, technical, marketing and climatic constraints, whilst allowing the livestock farmer to cope with his production plan in the medium term, or even the long term.** In accordance with this definition, our study aims to describe and evaluate the technical, economic and marketing leeway that helps livestock farmers to weather the storm created by these crises, and thus perpetuate their systems⁹. However, in the face of radical uncertainty (Knight, 1921) and the successive shock waves experienced by the beef market, the production plans of farmers are in a perpetual state of change. In other words, the flexibility concept purports to express the idea that a company, as an ongoing procedure, seeks to restore its equilibrium which can be redefined at a moment’s notice. It is highly connected with the structural and operational capacities of companies to react quickly to changes in demand. Thus, flexibility can assume multiple forms given the diversity of farms in terms of production choices and techniques, but also in terms of economic, financial and marketing objectives and strategies.

2. *Variables defining livestock farm flexibility*

We present here the variables that we consider apt in defining farm flexibility. These variables, either qualitative or quantitative, can be grouped in four categories : technical variables, economic and financial variables, variables relative to farmers’ marketing practices and strategies, and lastly structural variables. They were set down during three surveys in 14 farms specialized in Charolais cattle farming situated in the Saône-et-Loire department in Burgundy, France. For each category the 13 established variables were selected from a larger number of variables (n=25). Selection was made according to their differentiating role within the sample. We describe them below.

A – Technical flexibility of farms

Herd management in the 14 farms in the sample was pieced together for a one-year period (between 2001 and 2002 turnouts to grass). This exercise covered the practices used for managing animal diversity via identification of the different batches composed by the farmers: drafting,

⁶ Several years ago, the team of management economists in Dijon, France, developed the general theory of adaptive behaviour in order to explain the techno-economic decisions taken by farmers. This theory is based in particular on the coherence hypothesis and supports our analysis here (Brossier et al., 1997).

⁷ Resilience is the process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress. It means “bouncing back” from difficult experiences.

⁸ This research programme, co-financed by INRA and the Regional Council of Burgundy, associates researchers from INRA and stakeholders in farming development (Chamber of Agriculture, Institute of Livestock Farming, Regional Bureau of Ministry of Agriculture, Producer groups, Livestock farmer associations, Regional Chamber of Agriculture in Burgundy).

⁹ The paper given by H. Bardey (Bardey, 2002) at the last European IFSA symposium is based on the same overall research programme and presents the contract policy adopted between farmers in the area and marketing co-operatives.

replacement/culling of cattle, product orientation towards different marketing categories (Ingrand et al., 1993). After this exercise, the farmers were interviewed concerning the technical aspects of their system which they perceived to be vulnerable. To deal with this problem, two types of strategy can confer flexibility on the livestock system :

- i) very strict control strategy for zootechnical matters, especially reproduction (grouped calving, artificial insemination, synchronization). Adjustments and reaction to uncertainty are above all the result of management choices (regulation through feeding and reproduction practices), requiring close monitoring (indicators) by the farmer which protects him from drifting from his objectives),
- ii) A « *laissez-faire* » strategy, meaning lower requirements for supervision, intervention and indicator collection. Tasks are not concentrated within a set timetable according to their type. The hypothesis here is that animal heterogeneity is perceived less as a handicap but rather as an opportunity for adaptation to uncertainty on the herd level (Tichit et al., 2002). Adjustments and reaction to uncertainty are above all due to biological regulation rather than to the farmer's management practices.

The calving season

The calving season affects the quantity of winter food to be stored and also the way in which tasks are organized. When calving is early (autumn and early winter), cow lactation lasts for the greater part of winter incurring high food needs, and reproduction management takes place inside the buildings, with varying degrees of constraints according to whether the cows are in loose housing or attached (as is frequently the case in the Charolais area). On the other hand, when calving is late, the cows spend their pregnancy during the winter (low food needs) and reproduction can take place on grass. In the first case, the farmer is in control of system adaptation, and reproduction is usually strictly regulated (synchronization, insemination, pregnancy diagnosis). In the second case, adaptation is more biological. Consequences affect for example early selection of cows to be culled and thus selling periods.

Food management: diversity of winter fodder

Diversity of food stocks, particularly in making up the winter ration, strikes us as being a source of flexibility regarding potential animal categories to produce (e.g. : maize silage for fattening young trough-fed bull calves), and a source of security connected with cropping and harvesting conditions. This greater diversity of food stocks is thus connected with the production system (categories sold). It allows for adaptation where necessary regarding the allocation of forage resources.

Livestock numbers and stocking rate

Livestock numbers and technical stocking rate are very much up to the farmer, even if they are greatly affected by the subsidy system (premiums). Co-related with building capacity and field pattern, adjustment of animal numbers allows fairly high flexibility regarding food resources, but also task organization. The stocking rate per hectare is an interesting technical factor linked with intensification, and also with the search for CAP support. This is a differentiating factor in our sample and leads us to distinguish two groups.

B – Economic and financial flexibility

In traditional economics, these are variables easily adjustable in the short term by economic actors and considered to contribute to company flexibility. Given the scope of external constraints weighing on the farm itself (CAP constraints, Territorial Farm Contract commitment (CTE), marketing

commitments,...), we also explore the degree of farmer autonomy in his decision-making, as the factor which describe and explain not only economic and financial flexibility but also farm marketing flexibility.

Recourse to current account overdraft

Use of current account overdraft (CAO), authorizing an agreed overdraft for farmers by their banks, is characteristic of the low level of cash-flow leeway enjoyed by farmers and their dependents (bank charges between 13% and 15%). Two levels of flexibility were selected: high flexibility when farmers use this solution seldom or not at all and low flexibility when CAO is used highly and regularly, even continually up to the limit.

External revenue

Farmers who have complementary external revenue, either spouse revenue, or a family situation in which parents contribute revenue (single man living with retired parents), have higher leeway compared with those who only have revenue derived from the farm. On the other hand, farmers who only dispose of farm revenue register a low flexibility for this factor.

Level of savings

In considering the household savings level as a potential resource to be used to compensate loss of earnings incurred in a period of crisis, we can examine different corresponding levels of flexibility. However, we do not possess much precise information for this variable, given the reticence of certain farmers in revealing it.

C – Farm marketing flexibility

Sales profile

The categories of animals produced determine the sales profile of farmers. The more the farmer produces distinct categories of animals, the more he is capable of adapting to fluctuations in market demand. On the other hand, a farmer with a narrow range of animals produced will be dependent on market rate and outlets for that category¹⁰. Thus, we consider the « diversified product range » factor as a variable having a positive effect on farm flexibility.

Proportion of finished animals in total sales

Farms that fatten animals on site resisted better to the crisis than those just selling lean animals. Over and above the existence of a large number of outlets, farms having chosen the fattening option are considered to enjoy flexibility because they possess the necessary food resources for dealing with long production cycles, whilst farms having chosen the “lean” production option do not necessarily have the technical potential (buildings, economic constraints due to additional food expenditure) to bear the effects of non-sales. Flexibility of «fattening» farms should however be put into perspective given the specificities inherent to the sale of finished animals they must be sold quickly, or risk quality deterioration (excessive fattening) and economic depreciation (food costs).

¹⁰ The systems specialized in “birthing” (autumn store animals) depend in part on the Italian market.

Proportion of animals sold with quality labels

This factor allows us to examine the actual adaptation of farmers to quality sub-sectors, and reveals the degree of mutual cooperation between farmers and purchasers. Two levels of flexibility have been selected: high when the volume of animals marketed under these labels is higher than 10%, low when this proportion is less than 10%.

Sales schedule (yearly breakdown of sales months)

Regular breakdown of sales throughout the year is a source of flexibility in that i) it reveals the farmer's capacity to produce throughout the year and thus respond to industry demand (regular supplies), ii) it means that farmers are less sensitive to price variations, especially to price drops during sales peaks, with higher returns (higher prices) during slack periods.

Purchaser diversification

A large number of purchasers are able to leave a certain leeway to farmers in terms of negotiating power. Two levels of flexibility were examined for this factor: from 1 to 2 purchasers, flexibility is considered to be low; with more than 2 purchasers, it is considered to be high¹¹.

Member of Producer group or Farmer Association

We assume that the choice to belong to a producer group or farmer association is a question of differing viewpoints regarding the animal marketing function. In the first case, this function is entirely the responsibility of the producer group and the farmer considers that it is not his job. In the second case, the farmer wishes to retain some leeway in order to negotiate prices and make sales choices.

D – Structural variables

Usable farm area

This is a standard factor for differentiating livestock farms, even if it is less representative for assessing farm endurance or their degree of leeway. When co-related with herd size, the stocking rate is obtained which we feel is highly connected with system adaptation capacity (especially climate uncertainty). Farm area provides leeway not only for accumulating stocks (type and quantity) but also for organizing grazing.

Building constraints

Buildings can be a considerable source of constraints depending on their layout in relation to one another, their capacity, their practicality. For farmers, these constraints are such that they determine certain aspects of management strategy (reproduction period, categories of animals produced, type of food).

¹¹ This analysis can be disputed since a strong and trusting relationship with a producer group could have helped the farmers to weather the crisis, but this was not actually the case.

Section 2 «Theoretical» flexibility and reaction to crisis

1. Identified types of Flexibility

In this section, we propose to describe the different types of flexibility, which result from the combination of technical, economic, marketing and structural variables presented above. In order to analyze the different combinations possible, we used a corresponding factor analysis, complemented by our knowledge of the farms. We have thus identified 5 groups of livestock farms (Figure 1 and Table 1).

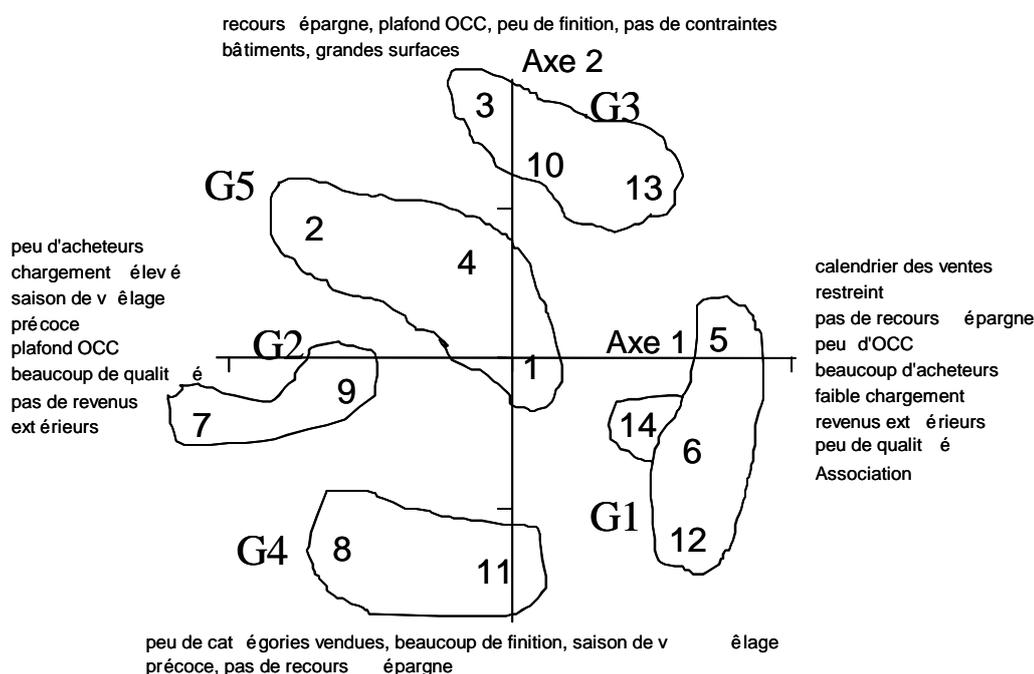


Figure 1: Factorial plan of the two first axes resulting from the corresponding factor analysis, allowing 5 groups to be differentiated among the 14 farms, according to the combination of values of technical, economic, marketing and structural variables

Description of the 5 groups

Group G1: Farms enjoying good overall flexibility. From the technical, economic and marketing points of view, these farms are relatively autonomous not only with regard to the marketplace but also technically speaking. The farmers consider that their system has performed well in the past and should allow them to confront future uncertainty. This autonomy, backed up by the “structural” potential of the farm allows them to make short-term adjustments without major consequences on routine functioning, nor on their medium or long-term plan. With one exception, there were no specific reactions to the crisis.

Group G2: Composed of farms enjoying high technical and marketing flexibility but low economic flexibility. From a technical point of view, these farms opted for a strategy controlling zootechnical processes (genetic selection of animals, batch management, feed supply¹²). These technical achievements allowed these farms to produce animals in line with market opportunities. High sales rates

¹² Concentrates are given to calves before weaning, practices typical of high technical requirements.

in official high quality sub-sectors have been observed in these farms. However, they do not have much leeway from either structural or economic points of view. This group was able to react to the crisis.

Group G3: This covers livestock farmers who can be qualified as opportunists, with a system associating high economic and marketing flexibility, but low technical flexibility. This low technical flexibility can be observed in the production choices made by these farms, mainly lean animals, despite high structural (farm area, buildings,...) and economic leeway. These farms did not react to the crisis.

Group G4: This covers farms enjoying high flexibility in three areas (economic, marketing, technical). Compared with Group 1 which has the same characteristics in terms of flexibility, this group is more committed to activity intensification, particularly animal finishing. These farms developed their fattening activity after the crisis.

Group G5: This represents farms with low flexibility in all areas. They have high structural constraints. These farms are vulnerable and, with the exception of one, did not react to the crisis because they lacked the means to do so.

2. Relationships between reaction and flexibility

Overall flexibility of farms is analyzed regarding three aspects: economic, technical and marketing, as set out in Table 1. "Low" and "high" levels are assessed by analyzing the combination of the different modalities of each category (i.e. technical, economic and marketing) of variables presented in chapter 2.

Table 1: Technical, economic and marketing flexibility qualified according to the identified groups of farms. Reaction or non-reaction to the beef industry crisis of winter 2000/2001

Group	Farms	Flexibility			Reaction to winter 2000/2001 crisis
		Technical	Economic	Marketing	
G1	5, 6, 12 (14)	High (natural regulation)	High	High	No except 14
G2	7, 9	High (zootechnical management)	Low	High	Yes
G3	3, 10, 13	Low	High	High	No except 3
G4	8, 11	High	High	High	Yes
G5	1, 2, 4	Low	Low	Low	No except 1

Confronting farm flexibility (versus non-flexibility) and farm reaction (versus non-reaction) regarding the crisis is an interesting exercise. Thus, when overall farm flexibility is either high or weak (Groups 1 and 5), no major reaction to the crisis was observed. In the first case, this absence of reaction can be put down to high ability to absorb shock without needing any specific measures to adapt. In the second case, this reflects on the contrary an incapacity to react. The case of two farms in Group 4, presenting high overall flexibility, and who reacted to the crisis, shows that the relationship is not systematic even though it can be explained¹³.

¹³ This can be illustrated by several examples: Farmers 7 and 8 decided to go into direct sales, even though their marketing flexibility is high. These are enterprising farmers who do not wait for problems to occur but anticipate them. Having acquired technical expertise (high technical flexibility of practices), henceforward they are aiming to acquire sales expertise. Farmers 9 and 11 reacted by increasing the proportion of fattening in order to maximize added value on site. These farmers had also acquired high technical expertise in farm management and the crisis endorsed their conversion to exclusive fattening. For farms 1 and 14, it appears that the changes (stalling construction, heifer fattening) were planned in any case, echoing the reactions displayed by farms 9 and 11. Farmer 3 is an opportunist, and reacts systematically. His reaction to the 2000/2001 crisis is therefore not singular.

Conclusion

This analysis of farm flexibility has revealed different combinations of technical, economic, marketing and structural factors. It provides information on the complementary and/or incompatible nature of certain technical and economic factors, and consequently on the choices made by livestock farmers. In some cases, presenting either a weak or lack of reaction to the crisis or the search for external solutions, a certain coherence or correlation exists between technical and economic flexibilities of farms. For “traditional” farmers, high technical or economic flexibility enabled them to cope unscathed with the crisis. In other cases, low flexibility compelled them either not to react, or react by seeking solutions outside the “production” aspect of the cattle farming system (versus marketing). Farms where incompatibility between high technical flexibility and weak economic flexibility was observed, reacted by modifying their production system.

We feel, on the basis of these preliminary results, that it is important to pursue this work by testing the pertinence of a livestock farm flexibility index which could combine some or all of the variables presented here, as well as others revealed by other surveys, currently under analysis, carried out in farms within the sample: i) task organization, ii) perception of the livestock farming profession, perception of the meaning of change for the farmer.

Short-term reactions to the crisis are not necessarily the sign of a satisfactory flexibility level for some farms and certain difficulties can be predicted for the farms in question in perpetuating their systems. However, these reactions are often the result of recommendations given by development stakeholders, anxious to help the farmers find solutions that they can implement rapidly. This result calls into question the way in which industry partners perceive and interpret the short-term reactions of farmers and *in fine* raises the question of sustainability for farms who, according to industry partners, set a “good example” by reacting. Since the sources of upset in general, including crises and uncertainty, are likely to increase, further research work in collaboration with different development organizations, will focus on the type of advice to implement and more generally, on the attitudes to adopt as suggested by this analysis.

Preliminary discussions have already taken place with development structures on the pertinence of the variables selected and their connection with farm flexibility. These connections need to be validated using a larger sample of farms, and so one research idea is to test them within a specific production system (calving, calving-fattening). These discussions open up a wider field of thought as to which farm estates should be encouraged to pursue the different farming systems explored, given that the capacity to adapt to uncertainty has become crucial, to the same extent as productivity, and represents a factor of efficiency in its own right.

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