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RED MEAT PRODUCERS' PREFERENCES FOR STRATEGIES TO COPE WITH THE CAP REFORM IN SCOTLAND

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Red Meat Producers' Preferences for Strategies to Cope with the CAP Reform in Scotland

Cesar L. Revoredo-Giha and Philip Leat¹

“Beef marketing. It is not possible to keep a suckler cow for a year for the value of 0.9 of a suckled calf with employed labour and paying any rent. The retailers will import 3rd world beef if price goes to economic levels. Therefore the beef production business will steadily melt away to a much smaller national herd. At present time it is best to take the SFP [single farm payment], reduce production and wait and see what happens. We have to try, where practicable, to market direct to our customers and exclude the big retailers. This is difficult, but we’re easing into it”

Comment of a North-East Scottish cattle producer after answering the FOODCOMM² questionnaire.

Abstract

It is recognised that following the reform of the Common Agricultural Policy (CAP) farmers may go through a period of transition where they evaluate the different production alternatives available to them according to their existing situation, expectations and preferences. Drawing on a survey of Scottish beef and sheep producers undertaken in mid-2006, the purpose of this paper is to analyse the preferences of producers in relation to a number of possible economic strategies for production adjustment following CAP reform. The results show that the nature of adjustment is still uncertain, reflected in the high numbers of farmers that do not know what strategy to follow or that will maintain the same production levels despite the reform. However, a sizable percentage of farmers indicate their intentions to concentrate on the production of high quality output.

Key Words: Scottish agriculture, single farm payment, red meat producers.

JEL code: Q18. –

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² FOODCOMM is the acronym of the EU-funded project “Key factors influencing economic relationships and communication in European food chains”.

Introduction

The introduction of the Single Payment Scheme (SFP), agreed in 2003, represented a structural change in the way farmers are supported. Accordingly, the possible responses to the reform are expected to be wider than those predicted by any typical economic model based on historical information, as farmers have to consider a number of new or increasingly important variables in their decision making. These may include a retirement strategy, how to invest the Single Farm Payment, possible succession plans, whether to cross-subsidise their production, and in what way their lifestyle might change, etc.

Furthermore, the Scottish Executive's document "A Forward Strategy for Scottish Agriculture: Next Steps" (SEERAD, 2006) recognised that farmers may go through a transition period after the Common Agricultural Policy (CAP) reform, and during this period they will evaluate how to react to the changes in support.

The purpose of this paper is to analyse farmers' strategic preferences for coping with the reform. We concentrate the analysis on red meat producers, specifically cattle and sheep producers, due to their importance for Scotland's agri-food economy. Within Scotland the beef and sheep sectors are major parts of the agricultural economy, representing 27 per cent and 10 per cent respectively of agricultural output in 2005, with beef being the largest single part of the farming industry (Scottish Executive, 2006a). In total there are approximately 13,300 holdings with beef cattle and 15,800 with sheep (Scottish Executive, 2006b). Whilst production is spread across the country, there are particular concentrations of cattle in the South and South West of Scotland as well as the North East, whilst for sheep there are concentrations in the South and South West and the Highlands.

Instead of using a mathematical model to forecast farmers' actions towards the SFP, the paper presents the results of a survey. The analysis of economic agents' (e.g., farmers) intentions as forecasts of future behaviour has long been subject to criticisms due to differences between intended and actual behaviour (e.g., Manski, 1990). Nevertheless, in contexts with high uncertainty, where the actual outcomes may depend on a high number of unobservable variables such as those already mentioned, the survey of intentions is probably one of the few methodologies able to capture what future events might be. In this sense, the results of farmers' intentions surveys regarding CAP reform may inform policy development because they provide information about the options that farmers are considering during the transition period. Additionally, they provide information about how different groups of farmers may react to CAP reform (e.g., sheep or cattle producers, breeders or finishers, regional preferences etc.) and therefore they help identify whether some of the strategies are related (i.e., farmers consider them as part of a package) and what variables might explain their potential uptake.

The paper is structured as follows. First, as a background, we briefly review the main changes introduced by the Midterm Review of the Common Agricultural Policy for the red

meat sector with emphasis on the Scottish sector. Next, we proceed with the empirical section that starts describing the applied survey and construction of the statistical database. Then, we report the statistical results and also discuss the implications. Finally, we present some conclusions from the analysis.

CAP reform and red meat production in Scotland

The SFP is part of a package of measures as part of the CAP Reform (European Council (EC) Regulation 1782/2003). It replaced direct support schemes such as the Arable Area Payments Scheme (AAPS), Beef Special Premium Scheme (BSPS), Extensification Payment Scheme (EPS), Sheep Annual Premium Scheme (SAPS), Slaughter Premium Scheme (SPS), Suckler Cow Premium Scheme (SCPS) and also associated payments like the LFA Supplement on sheep (Scottish Executive, 2005).

In Scotland the SFP is calculated on the basis of a business' track record of farming activity under pre-reform subsidy schemes and the land used to support the relevant payments (i.e., historic or reference period approach). Thus, the calculation is the average of the farming activity expressed as a financial value divided by the land area to arrive at a number and rate of Payment Entitlements (Scottish Executive, 2005).

In order to receive the SFP, farmers and crofters must maintain their land in good agricultural and environmental condition and respect regulations relating to public, animal and plant health, environmental protection and animal welfare. Regarding the agricultural conditions, the land must be used for arable land, permanent pasture (including common and shared grazing but excluding areas used for non-agricultural uses, e.g. buildings, permanent crops, forests, fruit, vegetables, table potatoes). Environmental conditions come as part of the cross-compliance conditions, and they comprise protecting the soil from erosion, maintaining organic matter levels in the soil and the soil structure; and ensuring a minimum level of maintenance for, and avoiding the deterioration of, habitats. The animal and plant health, environmental protection and animal welfare requirements are also part of the cross-compliance arrangements, deriving from a number of European Commission Directives and Regulations (i.e., 18 directives in total), and are known as Statutory Management Requirements. Examples of these directives are: Birds Directive, Habitats Directive, Groundwater Regulations and Identification and Registration of Livestock. Additionally, in order to receive the SFP the land must have been at the claimant's disposal for at least 10 months.

The funds allocated to the SFP are subject to the practice called "modulation" which consists of the reduction of payments to make the funding available for a range of measures designed to assist rural development. The current modulation rate is equal to 3.5 per cent. The funds from the modulation exercise are matched by the Treasury and the total is available to be spent in Scotland.

The EC Regulation allows retention of a maximum of 10 per cent of payments under each of the relevant sectors to establish a national envelope (i.e. a ring-fence sum of money) to address the protection or enhancement of the environment or for improving the quality and marketing of agricultural products. This is applied in Scotland in the form of the national envelope for the beef sector called the Scottish Beef Calf Scheme (SBCS). The aim is to provide an incentive for the retention of cattle in more peripheral areas both for environmental and social reasons. It is important to note that this is not extra money but a redistribution of the resources allocated to a sector (e.g., beef sector).

In 2004, SEERAD published an analysis of the impact of the introduction of the single farm payment and the national envelope for the beef sector (Scottish Executive, 2004). Unfortunately, a similar study for the sheep sector is not available. The results of the analysis show that the introduction of the SFP negatively affects breeder-producers as they are no longer able to factor future unclaimed subsidy payments into the price that they receive for their calves. Finishers, on the other hand, gain as their SFP is based on past subsidy claims irrespective of the prices they pay for store cattle. In contrast, the national envelope for the beef sector improves the position of breeder-producers at the expense of finishers. Additionally, the analysis indicates that the introduction of the SFP and the national envelope for beef have regional implications. Thus, the measures have a positive effect on the North East region and a negative one on the North West islands (Shetland, Orkney and Eileanan an Iar). The impact on the South West is mixed with negative effects in the Borders, Clyde Valley and Ayrshire and positive consequences in Dumfries and Galloway.

Due to the uneven distribution of effects of the measures associated with CAP reform (e.g., regional or breeder versus finishers), it is expected that farmers' strategies in response to the changes will also differ. In this sense, one might expect that in those areas where the CAP reform is envisaged to have more detrimental effect there might be greater inclination to adopt measures that reduce the unfavourable effects. Certainly, it is important to note, that the choice of measures is also constrained by producers' resources (e.g., human and non-human capital) and their willingness to change.

Empirical analysis

This empirical section comprises two parts. The first provides a description of the survey, the additional variables subsequently added to the database of survey responses and an overview of the sample. The second part presents and discusses the statistical results.

The data used in this study were collected through a postal survey undertaken between April and June 2006. The questionnaire comprised three sections. The first enquired about farmers' marketing problems; the second explored specific issues within the red meat supply chain with the purpose of providing a snapshot of how developed collaborative supply chains are in the sector and possible challenges ahead. The last section, which provides the core

information for this paper, dealt with possible farmers' responses for coping with the CAP reform.

The third part of the questionnaire enquired about farm characteristics and included two questions regarding farmers' intentions. The first question asked farmers about whether they expected their production to increase, decrease or remain the same in the future. The second question asked them to choose amongst a number of strategies that they would consider for coping with the effects of the CAP reform. The question presented the farmers with the following alternatives: no change in production; finishing animals at lower weight; changing production seasonality; cutting costs; producing higher quality; exiting production; reducing the scale of operation; investing to expand production; and diversifying to non-livestock enterprises. In addition, farmers could provide a different alternative. Separate answers were considered for cattle and sheep production.

The survey sample was designed to be representative of the Scottish beef and sheep producer sector (i.e., red meat producers). In order to exclude "spare time holdings", the sample considered only farms with sizes of 1 or more Standard Labour Requirement (SLR). The SLR is a measure of farm size based upon the labour input required (1 SLR equates to 1,900 hours of labour input required per year).

According to the June 2005 Scottish Agricultural Census, the number of beef and sheep producers in Scotland with more than 1 SLR was 5,481. From this universe 1,778 producers were selected to produce a target sample that was representative by region and farm size. The sample considered 14 Scottish regions (Shetland, Orkney, Eileanan an Iar, Highland, NE Scotland, Tayside, Fife, Lothian, Scottish Borders, East Central, Argyll and Bute, Clyde Valley, Ayrshire, Dumfries and Galloway³) and 4 farm size groups (farms from 1 SLR to 2 SLR, farms from more than 2 SLR to 3 SLR, farms from more than 3 SLR to 4 SLR, and farms with more than 4 SLR).

The survey questionnaire was mailed to the 1,778 producers, obtaining an overall response of 34.4 per cent after two mailing waves. The detailed distribution of the sample, together with the response rates by region and by SLR, is presented in Table 1.

From the 611 farmers of the resulting sample, 16.1 per cent were found to be cattle specialists, 27.3 per cent sheep specialist, with the remainder being producers of both cattle and sheep.

Most farmers engaged in the production of cattle were found to be exclusively breeders (53.2 per cent) or breeders and finishers (40.2 per cent), with only a small percentage being only finishers (6.6 per cent). These percentages were different in the case of sheep producers, where most were engaged in both breeding and finishing (55 per cent), followed by exclusively breeders (40.6 per cent) and only 4.3 per cent being purely finishers. Table 2

³ A map of the agricultural regions in Scotland (Scottish Executive, 2007) is provided in the Annex.

presents the distribution of farms in the sample according to the types of specialist/mixed producers and breeders/finishers.

Table 1: Distribution of the sample by region and SLR

Regions	Standard Labour Requirement Group (SLR)				Total	Response rates by region (%)
	From 1 to 2	From 2 to 3	From 3 to 4	More than 4		
Shetland	9	3	1	1	14	26.4
Orkney	11	9	4	4	28	37.3
Eileanan an Iar	4	0	0	0	4	33.3
Highland	30	15	7	20	72	32.1
NE Scotland	46	21	16	16	99	33.4
Tayside	17	9	6	18	50	48.5
Fife	5	2	4	2	13	28.9
Lothian	5	2	1	8	16	39.0
Scottish Borders	6	6	11	29	52	36.9
East Central	4	4	2	11	21	35.6
Argyll & Bute	7	6	7	10	30	26.3
Clyde Valley	14	11	1	8	34	26.4
Ayrshire	21	17	7	14	59	37.6
Dumfries and Galloway	39	24	19	37	119	36.2
Total	218	129	86	178	611	
Response rates by SLR (%)	33.6	34.9	34.0	35.1	34.4	

Table 2: Distribution of producers according to breeder/finisher and specialist/non-specialist 1/

a. For cattle				
	Breeder	Breeder/Finisher	Finisher	Total
Cattle specialist	137	116	23	276
Row distribution (%)	49.6	42.0	8.3	100.0
Column distribution (%)	58.5	65.5	79.3	62.7
Non-specialist	97	61	6	164
Row distribution (%)	59.1	37.2	3.7	100.0
Column distribution (%)	41.5	34.5	20.7	37.3
Total	234	177	29	440
Row distribution (%)	53.2	40.2	6.6	100.0
Column distribution (%)	100.0	100.0	100.0	100.0
b. For sheep				
	Breeder	Breeder/Finisher	Finisher	Total
Specialist	60	48	5	113
Row distribution (%)	53.1	42.5	4.4	100.0
Column distribution (%)	53.1	31.4	41.7	40.6
Non-specialist	53	105	7	165
Row distribution (%)	32.1	63.6	4.2	100.0
Column distribution (%)	46.9	68.6	58.3	59.4
Total	113	153	12	278
Row distribution (%)	40.6	55.0	4.3	100.0
Column distribution (%)	100.0	100.0	100.0	100.0

Notes:

1/ Number of missing cattle producers is 45 and for sheep 35 (did not answer whether breeder or finisher). They were excluded from the computations.

Regarding the marketing channel used, the survey showed that producers use a variety of marketing channels for their output. However, the two most common channels found for both cattle and sheep production were livestock auctions (the average percentages of the output marketed through this channel was 58.5 for cattle and 65.5 for sheep), followed by marketing directly through processors and abattoirs, where the average percentages of marketed output were 26.2 for cattle and 14.9 for sheep.

The information provided by the survey was complemented by information from the Agricultural Census describing the production of each one of the farms of the sample, and with further information from the Farm Structure Survey. Unfortunately, the information from the latter was only available for 59 per cent of the sample.

Results and discussion

The tree diagrams presented in Figure 1 (comprising Figures 1.a and 1.b) summarise the responses obtained from the producers regarding their strategies to cope with the CAP reform. Figure 1.a refers to their strategies with respect to their cattle production whilst Figure 1.b refers to their sheep production.

The different responses considered in the study were divided into two main groups: those that only indicated a change or not in the level of production, labelled “status-quo” (to indicate a relatively passive response rather than no response at all) and those that indicated a sort of active response that we labelled “strategy”. The status-quo responses were: no change in production (N1); exiting production (N2); reducing scale of operation (N3). The strategies were: finishing animals at lower weight (A); changing production seasonality (B); cutting costs (C); producing higher quality (D); investing to expand production (E); and diversifying to non-livestock enterprises (F).

Additionally, we deployed the term “pure strategy”, when a farmer chose only one strategy and “mixed strategy” when the farmer chose more than one strategic response. It is important to note that the fact that the farmer had chosen more than one strategy does not mean necessarily that it is a strategy comprised of several parts. This is due to the fact that in the questionnaire farmers were asked to choose all the possible alternatives that they were considering to cope with the CAP reform. Therefore, from a group of chosen alternatives, farmers might end up applying only some of their indicated strategic responses.

The figures present the number of cases under each category and percentages with respect to the preceding major categories. For instance, in the case of the pure strategy categories, they present three percentages: from left to right, the first percentage is with respect to the total number of farmers in the group, the second is with respect to the total number of farmers applying at least one strategy and the third one is with respect to the number of cases with a pure strategy.

For both cattle and sheep, the analysed responses corresponded to those of producers that were specialist or mixed producers. For instance, the analysis of cattle production only considered responses of producers that were cattle specialists or were producers of both cattle and sheep, and excluded specialist sheep producers that might have some cattle. The classification of specialists and mixed producers was provided by SEERAD.

Figures 1.a and 1.b indicate that regarding cattle production, approximately 39 per cent of the 485 farmers are not considering any strategy in particular (i.e., status-quo). In the case of sheep production that percentage is 48.6 per cent of the 313 farmers. These large percentages may indicate some degree of uncertainty about future economic conditions, which makes it difficult to envisage a more precise strategy. In addition, these high figures may also be interpreted as indicating that some farmers are in some sense willing to avoid restructuring their business by subsidising them with the proceeds from the single farm payment.

12 per cent of the cattle producers chose one strategy, whilst in the case of sheep this percentage was 15 per cent. Within the strategies, the most commonly chosen was “to improve the quality of the production” for both cattle and sheep production. In the case of cattle it represented 44.8 per cent of the total number of pure strategies and 39.6 per cent in the case of sheep. This strategy is followed by two other pure strategies: reduction of costs (13.8 and 22.9 per cent of the number of pure strategies for cattle and sheep respectively) and investment to expand production (20.7 and 27.1 per cent for cattle and sheep respectively).

The percentage of farmers indicating more than one response (i.e., mixed strategies) was also significant (48.9 per cent in the case of cattle producers and 36.1 in the case of sheep producers). It is important to note that within the number of cases considering at least one strategy, the case of mixed strategies was the most common (80.3 per cent for cattle and 70.2 per cent for sheep).

Given the importance of mixed strategies pointed out in Figure 1.a. and 1.b, we proceeded to analyse the degree of relationship between pairs of strategies. Tables 3 and 4 measure the degree of association between all the categories for cattle producers and sheep producers.

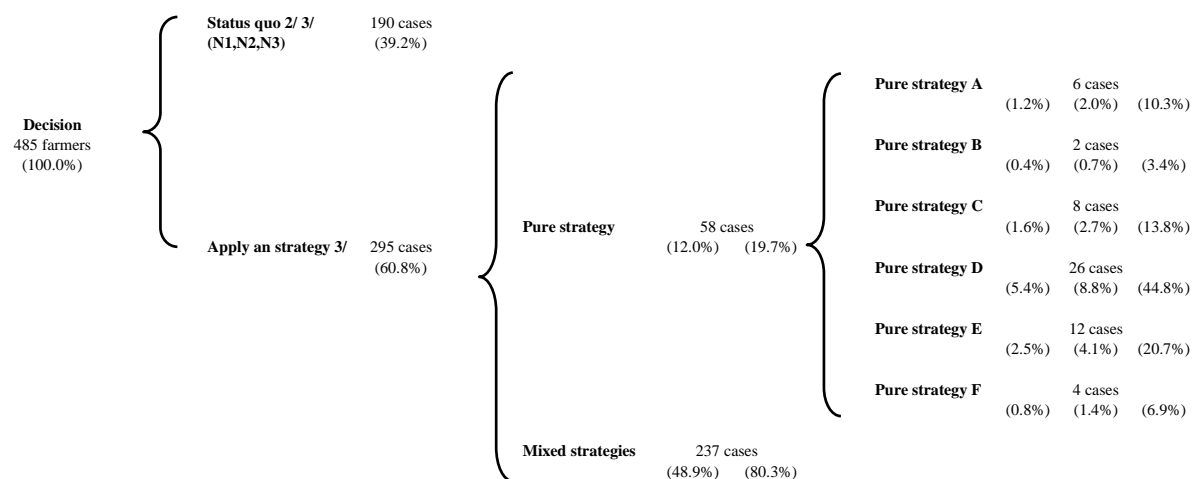
The tables are comprised of two parts: the upper part of the table presents the Chi-square test of the degree of independence between the categories. The null hypothesis is that the categories are independent, therefore when rejected it indicates a degree of association between categories. The lower part of the table corresponds to the contingency coefficient that measures the degree of association of two categorical variables.

It is important to note that in contrast to the Pearson correlation coefficient, which measures the degree of association for continuous variables, the contingency coefficient does not have a maximum value of 1 (although the minimum is equal to 0). In fact, as can be seen in Tables 3 and 4, the values in the diagonal are 0.71 instead of 1. Additionally, the Chi-

square tests (upper part of the tables) are used to verify whether the contingency coefficients are statistically significant different from zero (i.e., the categories are not independent). Those coefficients that are significantly different than zero appear highlighted in the table.

Figure 1: Farmers' Preferences for Strategies to Cope with the CAP Reform

1.a. Strategies Chosen by Farmers Regarding Their Cattle Production 1/



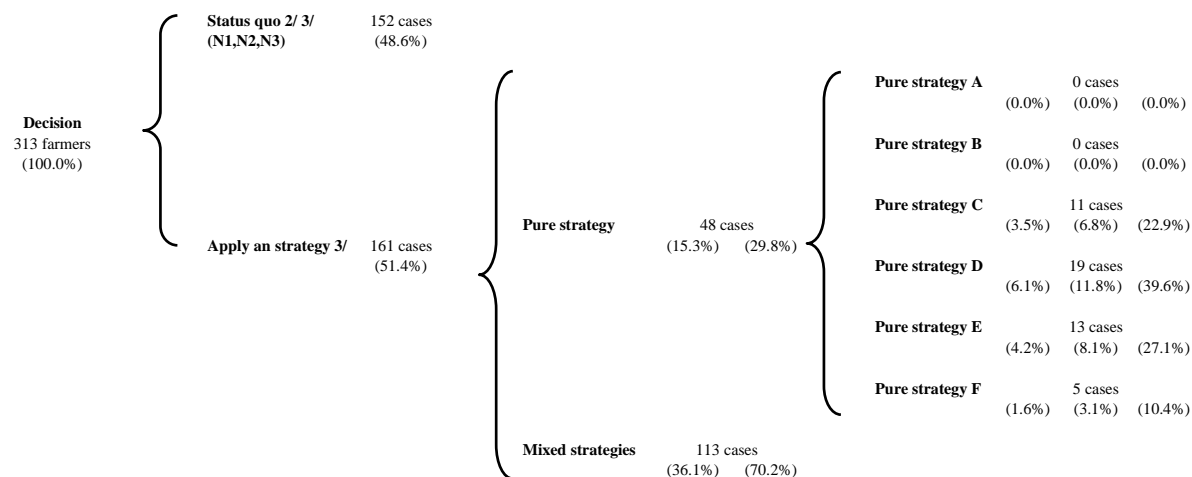
Notes:

1/ It only considers cases of cattle specialist producers or cattle and sheep producers

2/ Farmers that chose one of the following answers: (i) will not introduce any change, (ii) reduce the scale of their operation, (iii) exiting production or (iv) did not answer.

3/ The strategies are as follows: N1=No change in production; A=Finishing animals at lower weight; B=Changing production seasonality; C=Cutting costs; D=Producing higher quality; N2=Exiting production; N3=Reducing scale of operation; E=Investing to expand production; F=Diversifying to non-livestock enterprises.

1.b. Strategies Chosen by Farmers Regarding Their Sheep Production 1/



Notes:

1/ It only considers cases of sheep specialist producers or cattle and sheep producers

2/ Farmers that chose one of the following answers: (i) will not introduce any change, (ii) reduce the scale of their operation, (iii) exiting production or (iv) did not answer.

3/ The strategies are as follows: N1=No change in production; A=Finishing animals at lower weight; B=Changing production seasonality; C=Cutting costs; D=Producing higher quality; N2=Exiting production; N3=Reducing scale of operation; E=Investing to expand production; F=Diversifying to non-livestock enterprises.

Table 3: Degree of association between red meat producers' strategies to respond to CAP reform – Cattle Production

χ^2 with 1 degree of freedom is 6.64 with $\alpha=0.01$

Strategies	Strategies								
	N1	A	B	C	D	N2	N3	E	F
N1	485.0	4.3	8.9	0.9	8.1	3.2	61.5	22.6	16.8
A		485.0	15.7	0.3	2.2	0.2	0.1	2.3	0.1
B			485.0	37.2	12.8	1.0	1.8	2.7	7.9
C				485.0	14.0	1.9	0.0	2.1	0.2
D					485.0	3.7	0.0	12.7	1.8
N2						485.0	0.1	1.4	1.7
N3							485.0	20.5	20.4
E								485.0	1.2
F									485.0

Contingency coefficient (i.e., degree of association between pairs of strategies)

Strategies	Strategies								
	N1	A	B	C	D	N2	N3	E	F
N1	0.71	0.09	0.13	0.04	0.13	0.08	0.34	0.21	0.18
A		0.71	0.18	0.02	0.07	0.02	0.01	0.07	0.02
B			0.71	0.27	0.16	0.04	0.06	0.07	0.13
C				0.71	0.17	0.06	0.00	0.07	0.02
D					0.71	0.09	0.00	0.16	0.06
N2						0.71	0.02	0.05	0.06
N3							0.71	0.20	0.20
E								0.71	0.05
F									0.71

Notes:

The strategies are as follows: N1=No change in production; A=Finishing animals at lower weight; B=Changing production seasonality; C=Cutting costs; D=Producing higher quality; N2=Exiting production; N3=Reducing scale of operation; E=Investing to expand production; F=Diversifying to non-livestock enterprises.

Cattle production shows 13 significant correlations and sheep production only 7. Of these correlations, the only one that looks puzzling is the significant degree of association between N1 and N3; this is between no change in production and decrease in the scale of production, which can be interpreted as farmers' uncertainty about the direction in the change of production scale. Another significant association was that one between no change (N1) in production and investing to expand production (E). Whilst, this answer might sound contradictory, the farmer choosing these options might have been considering N1 as a short term option and E as a long term one.

Regarding the category “no change in production”, in the case of cattle producers it is associated with change in production seasonality, the production of higher quality, investing to expand production and with diversifying to non-livestock enterprises. In the case of sheep producers it is associated with only the first three mentioned categories.

In both cattle and sheep, the strategy of increasing the quality of production is correlated with no change in production, change in seasonality, cost reduction and investment to expand production.

One of the results of the IMCAPT project (SAC 2006) was to show the dispersion in cost efficiency amongst farmers and the possibility of improving profitability by reducing the gap between them. It appears from Figures 1.a and 1.b, and from the association analysis, that cost reduction is considered as a strategy by some farmers (although it is not the most common strategy) and it also appears associated with the strategy of changing the seasonality of production for both cattle and sheep.

The strategy of diversifying to non-livestock enterprises is only correlated with other categories for cattle producers. It is related to no change in production, decreasing production and with change in seasonality.

Table 5 presents frequency distributions of the main strategies, putting emphasis on the strategy “producing higher quality”. The table considers only those strategies with two or more cases (the total number of cattle farmers in the sample that selected producing higher quality was 178, i.e., 36.7 per cent and in the case of sheep producers 93, i.e., 29.7 per cent).

As shown in the table, cattle producers chose a greater range of possible strategy combinations than sheep producers. It is important to note that if we group those farmers choosing “producing higher quality”, despite whether they are planning to maintain or decrease their scale of production (i.e., cases D, N1D, N3D), then in the case of cattle they are 37 per cent of the total number of farmers that selected the option and 46 per cent in the case of sheep.

Table 4: Degree of association between red meat producers' strategies to respond to CAP reform – Sheep Production

χ^2 with 1 degree of freedom is 6.64 with $\alpha=0.01$

Strategies	Strategies								
	N1	A	B	C	D	N2	N3	E	F
N1	313.0	0.1	2.4	0.7	10.8	2.2	40.2	6.4	3.6
A		313.0	7.5	3.4	2.6	0.1	1.1	0.2	1.5
B			313.0	11.6	14.4	3.0	0.8	8.7	4.2
C				313.0	13.8	0.8	0.9	0.2	0.8
D					313.0	1.7	0.7	3.5	2.0
N2						313.0	0.0	0.4	4.9
N3							313.0	6.0	6.0
E								313.0	0.2
F									313.0

Contingency coefficient (i.e., degree of association between pairs of strategies)

Strategies	Strategies								
	N1	A	B	C	D	N2	N3	E	F
N1	0.71	0.02	0.09	0.05	0.18	0.08	0.34	0.14	0.11
A		0.71	0.15	0.10	0.09	0.02	0.06	0.03	0.07
B			0.71	0.19	0.21	0.10	0.05	0.16	0.12
C				0.71	0.21	0.05	0.05	0.03	0.05
D					0.71	0.07	0.05	0.11	0.08
N2						0.71	0.00	0.04	0.12
N3							0.71	0.14	0.14
E								0.71	0.03
F									0.71

Notes:

The strategies are as follows: N1=No change in production; A=Finishing animals at lower weight; B=Changing production seasonality; C=Cutting costs; D=Producing higher quality; N2=Exiting production; N3=Reducing scale of operation; E=Investing to expand production; F=Diversifying to non-livestock enterprises.

In the case of cattle producers, the two most common combinations that include “producing higher quality” are with “investing to expand production” (18.5 per cent of the total of cattle farmers that chose producing higher quality), “cutting costs” (16.2 per cent) and “diversification to non-livestock activities” (11.2 per cent). In the case of sheep producers, the combination “producing higher quality” and “cutting costs” is the most common (19.4 per cent of the total of sheep farmers that chose producing higher quality), followed by the combination with “diversification to non-livestock activities” (11 per cent) and with “investing to expand production” (6.4 per cent).

Table 5: Selected Strategies to Cope with the CAP Reform

Related to Cattle Production 1/				Related to Sheep Production 2/			
Combination	Frequency	Percentage	Cumulative Percentage	Combination	Frequency	Percentage	Cumulative Percentage
Improve production quality	154	31.8		Improve production quality	78	24.9	
D	26	5.4	5.4	D	19	6.1	6.1
N1D	24	4.9	10.3	N3D	15	4.8	10.9
DE	18	3.7	14.0	N1D	9	2.9	13.7
N3D	16	3.3	17.3	CD	8	2.6	16.3
AD	8	1.6	19.0	N1CD	7	2.2	18.5
CD	7	1.4	20.4	DE	6	1.9	20.4
DEF	6	1.2	21.6	CDF	3	1.0	21.4
N1BCD	5	1.0	22.7	N3DF	3	1.0	22.4
N1CD	5	1.0	23.7	DF	2	0.6	23.0
N3DF	5	1.0	24.7	N1DF	2	0.6	23.6
BCD	4	0.8	25.6	N3AD	2	0.6	24.3
DF	4	0.8	26.4	N3BD	2	0.6	24.9
N3BD	4	0.8	27.2				
BCDEF	3	0.6	27.8	Other strategies	54	17.3	
BD	3	0.6	28.5	E	13	4.2	4.2
ACD	2	0.4	28.9	C	11	3.5	7.7
ADE	2	0.4	29.3	N3F	9	2.9	10.5
BDE	2	0.4	29.7	F	5	1.6	12.1
CDE	2	0.4	30.1	N1F	5	1.6	13.7
N3ADF	2	0.4	30.5	N1C	4	1.3	15.0
N3BDF	2	0.4	30.9	N3C	3	1.0	16.0
N3CD	2	0.4	31.3	AC	2	0.6	16.6
N3CDF	2	0.4	31.8	N1E	2	0.6	17.3
Other strategies	93	19.2					
N3F	14	2.9	2.9				
E	12	2.5	5.4				
C	8	1.6	7.0				
N1F	8	1.6	8.7				
N1C	7	1.4	10.1				
A	6	1.2	11.3				
F	4	0.8	12.2				
N1B	4	0.8	13.0				
N3C	4	0.8	13.8				
AE	3	0.6	14.4				
BC	3	0.6	15.1				
CE	3	0.6	15.7				
N1E	3	0.6	16.3				
AB	2	0.4	16.7				
ABCE	2	0.4	17.1				
ABE	2	0.4	17.5				
B	2	0.4	17.9				
CF	2	0.4	18.4				
N3BC	2	0.4	18.8				
N3BF	2	0.4	19.2				
Total	247	50.9		Total	132	42.2	

Notes:

1/ Each letter corresponds to one strategy. Several letters indicate that several strategies are considered. The meaning of each letter is as follows: A=Finishing animals at lower weight; B=Changing production seasonality; C=Cutting costs; D=Producing higher quality; E=Investing to expand production; F=Diversifying to non-livestock enterprises; N1=No change; N2=Exiting production; N3=Reducing scale of production;.

2/ It only considers cases of cattle specialist producers or cattle and sheep producers

3/ It only considers cases of sheep specialist producers or cattle and sheep producers

Amongst the other strategies in Table 5 (i.e., those not including improve production quality) the most important for cattle was cutting costs and diversify to non-livestock activities followed by expand production through investment. The same three strategies were found in the case of sheep producers, but the cutting cost strategy was the most important, closely followed by diversify to non-livestock activities and by expand production through investment.

Table 6 presents a regression analysis of the two most common answers for cattle production and for sheep production, i.e., no change in production and producing higher quality. A discrete choice regression, i.e., logit model, was used to identify some variables that may be associated with the decisions behind the two mentioned categories.

The dependent variable in the logit model is a dichotomous variable (i.e., dummy variable) that takes the value of 1 when the category is selected (e.g., no change in production) and 0 otherwise. Thus, the model measures the probability of choosing the response coded with a 1. The logit model is given by equation (1) (where the sub-index t represents observations):

$$(1) \quad P_t = F(I_t) = F\left(\sum_{i=1}^k \beta_i X_{it}\right) = \frac{1}{1 + \exp\left(-\sum_{i=1}^k \beta_i X_{it}\right)}$$

Where P_t is the probability of choosing the category (e.g., producing high quality), I_t is an index equal to $I_t = \sum_{i=1}^k \beta_i X_{it}$, β_i are the model parameters and X_{it} are the explanatory variables, $F(\bullet)$ is the logistic distribution (i.e., cumulative) function and k is the number of parameters including the intercept (i.e., $X_{1t} = 1$).

Regarding the interpretation of the coefficients, a positive (negative) coefficient indicates that the variable has a positive (negative) effect on the probability of choosing the category.

The variables chosen in the analysis were dummy variables representing the different regions (shown in Table 1); a continuous variable, the standard labour requirement (SLR) representing the farm size (SLR was also incorporated in the regressions in a non-linear way by including a quadratic term in addition to the linear one); and dummy variables for whether the farmer was a specialist or had mixed production and whether a breeder or finisher. All the variables were tried in the four regressions and only those that were significant (or approximately) were kept in the table.

Table 6: Logit analysis of selected farmers' responses

Dependent Variable	Explanatory variables														χ^2 2/	Sig. 3/
	Intercept	Shetland	Orkney	Highland	Tayside	Lothian	Scottish Borders	Clyde Valley	Ayrshire	Dumfries and Galloway	Farm size (slr)	Squared Farm size (slr ²)	Breeder and finisher	Finisher		
I. Cattle production																
No change in production	Coef.	0.043					-0.755			0.413	-0.088		-0.817		28.386	***
	t 1/	0.228					-1.556			1.681	-2.104		-3.806			
Concentrate on high quality	Coef.	-0.822			-0.781	-1.103			1.017		0.204	-0.021	0.338		32.213	***
	t 1/	-2.692			-2.137	-2.162			2.897		1.541	-1.805	1.648			
II. Sheep production																
No change in production	Coef.	-0.296	-1.244				0.582			0.721	-0.084			0.773	12.647	**
	t 1/	-1.363	-1.594				1.486			1.775	-1.780			1.252		
Concentrate on high quality	Coef.	-1.417		1.569		-1.379		1.064			0.175	-0.008			13.553	**
	t 1/	-4.755		1.786		-1.317		2.098			1.772	-1.350				

Notes:

1/ Asymptotic t statistic.

2/ Value of the log likelihood ratio test under the null hypothesis that all the coefficient except the intercept are equal to zero.

3/ * significant at 10 per cent; ** significant at 5 per cent, *** significant at 1 per cent.

As measured by the likelihood ratio test -which indicates whether the explanatory variables provide some explanation of the variance, in addition, to that already explained by the intercept- the cattle production equations were more significant than those for sheep. In the former the likelihood ratio test rejected the null hypothesis at 1 per cent, as opposed to 5 per cent for the latter.

With respect to cattle production, the probability of choosing no change in production is affected negatively (i.e., reduces the probability) if the farm is located in the Scottish Borders and positively if it is in Dumfries and Galloway. In all the other regions, the effect was not statistically significant and different from that captured by the intercept. Farm size has a negative effect on the probability, indicating that the bigger the farm the less probable it is that changing production was selected. A similar result was found with respect to whether the farmer is a breeder and finisher.

Regarding the answer of concentrating on high quality production for cattle, location in the regions of Tayside and Lothian had a negative impact on the probability of selecting this strategy, whilst location in Ayrshire showed a positive effect. The regional effects for this regression were quite significant with asymptotic t statistics above 2. Farm size entered into the regression in a non-linear way. The signs showed that the probability of selecting the quality strategy increases with farm size but decreases beyond a certain point. Whether the farmer was a breeder and finisher also had a positive impact on the probability of concentrating on higher quality.

For sheep production, the results indicated that farms from Shetland are less likely to change their production whilst those in the Scottish Borders, and Dumfries and Galloway showed the opposite effect. Similar to the response for cattle, farm size affected negatively the

probability of choosing no change. It is important to note that the quadratic term was not statistically significant. If the farmer is a finisher this had a positive effect on the probability of not introducing production changes.

Finally, farms in Orkney and the Clyde Valley showed a greater tendency to concentrate on high quality production, whilst Lothian farms showed just the opposite. In terms of farm size, the results showed a non-linear effect that increases the probability until some point after which a decrease occurs.

Conclusions

The results show that the nature of adjustment is still uncertain, reflected in the high numbers of farmers that do not know what strategy to follow, or that will maintain the same production levels despite the reform (a reflection of this situation is the fact that beef cow numbers post reform, i.e., 2004 to 2006, decreased only by about 1.2 per cent). However, a sizable percentage of farmers indicated their intention to concentrate their production on high quality output. The latter response opens the possibility of performance-enhancing strategies, which not only improve production quality, but also may influence the cohesion/relationships and communication along the red meat supply chain.

Overall, the analysis shows that a large proportion of farmers surveyed indicated no change in production or a decrease in production without choosing any specific strategy. This may be explained by the uncertain conditions surrounding agriculture after the CAP reform and still prevalent at the time of the survey. It may also indicate that some farmers are willing to subsidise their production (by using the SFP to fund their productive activities) in order to maintain their farming lifestyle.

It is important to note that the variety of strategies chosen is high, and this is particularly true in the case of cattle production. However, amongst the strategies –i.e., all the alternatives other than to remain unchanged, to decrease the scale of production or exit the business- the preferred option is that of concentrating on higher quality. This result is clear from the various analyses. Moreover, it might be regarded as positive in that it matches the broad goals of the Forward Strategy and because it introduces clear avenues of action. It also indicates a positive background attitude for the national envelop for beef to develop farmers' interest in producing higher quality.

Other strategies that show some importance and were also combined with “concentrating on high quality production” were cutting costs, which is important given the cost efficiency dispersion observed in livestock production, and diversification to non-livestock activities.

The logit regression analysis was used to identify variables that may characterise those farms answering "no change in production" and "concentrating on higher quality". It showed

some differing regional effects (i.e., some regions have positive effects whilst others have negative effects on the probability of choosing the respective answers). Also, the farm size variable presented a negative effect on the probability of not changing production for both cattle and sheep and a non-linear effect in the case of concentrating on higher quality. Additionally, in some of the regressions, being a breeder and finisher -as in cattle- might have a negative effect on the probability of not changing production and positive effect on the probability of concentrating on high quality production. For sheep being a finisher, increases the probability of not changing production.

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Annex 1. Agricultural regions of Scotland



Source: Scottish Executive (2007)