

THE EFFECTS OF COMMON AGRICULTURAL POLICY ON AGRO-ENVIRONMENTAL QUALITY IN LIVESTOCK FARMING: THE CASE OF ANDALUSIA

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Community consumers are becoming increasingly aware of food product quality and of the impact of food and agricultural policies on production and transformation methods.

However, it is not easy to define agro-food product quality, since perceptions of what constitutes product "quality" differ among the various agents in the distribution chain: farmers, dairy producers, consumers and even society as a whole.

However, one aspect that is gaining wider acceptance is the environmental component of "quality" in agro-alimentary products, so much so that it is now considered to be another fundamental "characteristic" of food supply, together with "safety" i.e. the absence of harmful chemicals or biological elements.

The quality demands of Community consumers are also broadening to encompass the methods used in food production and transformation, given the effects of these processes on health. The sensitivity of demand to all these con-

ABSTRACT

Community consumers are becoming increasingly aware of food product quality and of the impact of food and agricultural policies on production and transformation methods. However it is not easy to define agro-food product quality, since perceptions of what constitutes product "quality" differ among the various agents in the distribution chain. More highly-developed societies demand from their governments a more belligerent stance both combating environmental pollution and supporting the conservation and protection of Nature. Thus, the justification for certain measures incorporated in the CAP reform (1992), primarily aimed at reducing agricultural surpluses, was the need to reflect the environmental concern expressed by Community countries. The aim of this article is, then, to analyse the effects brought about by the new set of agri-environmental measures in the achievement of both a food quality improvement and of an environmental friendly change in production systems. The bovine sector in Southern Spain, has been selected for that purpose. Results show the different impacts of these new measures between dairy and beef productions systems and among the several levels along the "bovine agro-food chain". Conclusions point out to the need of improving both the design and the implementation of this kind of policies.

RÉSUMÉ

Les consommateurs sont de plus en plus concernés par la qualité des produits agro-alimentaires et par l'impact des politiques alimentaires et agricoles sur les méthodes de production et transformations des aliments. Mais il n'est pas facile à définir la qualité des produits agro-alimentaires, parce que les perceptions sur ce qu'on entend par qualité sont différentes parmi les différents agents du système alimentaire. Les sociétés les plus développées demandent à ses gouvernements l'adoption de mesures contre la pollution de l'environnement et, au même temps, des mesures pour maintenir la conservation et la protection de la Nature.

C'est dans ce cadre, que certaines mesures, que dans l'origine étaient destinées à la réduction des excédants agricoles, ont été incorporées dans la Réforme de la PAC (1992), dans le but de tenir compte de l'intérêt montré par les pays communautaires sur les questions relatives à l'environnement. L'objectif de cet article est d'analyser les effets des nouvelles mesures agro-environnementales sur la qualité des produits bovins, ainsi que sur les méthodes de production moins agressifs sur la Nature. Le secteur bovin choisi a été celui du Sud de l'Espagne. Les résultats montrent qu'il y a des différences entre les impacts sur les systèmes orientés à la production laitière et ceux destinés à la production de viande. De même on trouve aussi des résultats différents en fonction du niveau de la filière. Les conclusions relèvent la question de l'adéquation des mesures actuelles aux objectifs prévus et les possibilités d'amélioration dans le domaine de l'implémentation de ce type de politiques.

siderations has been clearly evidenced by the recent crisis surrounding Bovine Spongiform Encephalopathy (BSE), more commonly known as "mad cow disease".

More highly-developed societies demand that their governments adopt a belligerent stance in combating environmental pollution while at the same time supporting the conservation and protection of Nature. The failure of markets to handle certain external factors, caused by the lack of "environmental quality" (harmful effects on public health, reduction of the natural heritage for future generations etc.), places an important regulatory responsibility on governments in this area.

The justification for certain measures incorporated in the CAP reform (1992), originally aimed at reducing agricultural surpluses, was the need to reflect the environmental concern expressed in Community countries. It is also argued that the measures aimed at reducing surpluses will facilitate the achievement of Community environmental policy objectives. In this

regard, the European Community hopes that the measures focused on reducing agricultural production⁽¹⁾, by promoting less-intensive production methods, will have a favourable impact on the environment and also enable various production sectors to adapt to market requirements.

"Quality" (i.e. environmental quality) in agriculture, and here specifically in livestock farming, thus requires a

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(1) Price reduction measures, reduced use of fertilisers and phytosanitary products, or the use of biological agricultural methods, extensification, set-aside etc.

non-traditional use of resources: lower livestock numbers per farm; better selection of raw materials; use of more hygienic, non-pollutant and water-saving methods of handling and processing, etc.

Many studies have reported the achievements of the CAP, as well as its negative effects on output, yields, and even the resulting inequality among farmers and certain intra- and inter-regional imbalances. However, fewer studies focus on its effects in terms of the environmental quality of production systems. An analysis of these effects, albeit limited to a specific sector and area, i.e. livestock farming in Andalusia, is thus deemed valuable. Although the results of Community measures relating to the environmental quality of livestock products can only be evaluated in the medium and long term, the six years since the Community framework was substantially modified in 1992 seem time enough to attempt an analysis of the current situation in terms of the "environmental quality" of the livestock sector. The following questions arise: Are livestock farmers adapting to their changing relationship with the environment and to the environmental demands of Community regulations? Or rather, are changes aimed at achieving greater respect for the environment and for product quality and safety actually taking place in the production system? In short, what effects is agro-environmental policy having on the sector and area under study? The aim of this article is to provide at least partial answers to these questions.

METHOD

Research was based on the following considerations:

1. The new reference framework created by the CAP reform, the new demands of society⁽²⁾ and new technologies have changed the strategy of livestock farmers and even of the Andalusian Regional Government itself⁽³⁾.

2. Livestock farming based on the productivist agricultural model generates a series of negative external effects for the environment, as well as for food quality and safety.

3. Agro-environmental policies will encourage farmers to implement changes in direction and farm size which reflect the will of the politicians drawing up these policies; however, the degree of efficiency achieved depends on a number of factors concerning the structure of the sector itself, the process of policy implementation (at Community, national and regional level), as well as on market conditions, which will eventually provide a new model for livestock farming.

In short, livestock production systems are not only subject to market conditions but also to the effects of various financial (aid), institutional and organisational instruments of agricultural, agro-environmental and environmental policy. Farmers may face a dilemma as to whether to base their strategies on regulatory require-

ments or on market prices; through price incentives, the market rewards certain characteristics of the product (meat or milk), which do not always correspond to those defined as desirable in Community regulations.

This general approach aims to identify and analyse the following aspects in order to determine the effects of agro-environmental measures on the environmental quality of livestock: firstly, the "population/activity" under study - the cattle-farming sector in Andalusia prior to the entry into force of the agro-environmental regulations (period 1987-93); secondly, the *changes sought* by agro-environmental policies relating to the livestock industry and the implementation of aid provided under these policies (objectives); thirdly, the results of the application of these policies on agro-environmental quality factors in livestock farming. Finally, the conclusions will be presented.

Information contained in this study was obtained from the following sources:

- *Secondary information*: relating to regulations on agro-environmental policies: Official Journal of the European Communities, the Official Spanish State Gazette, and the Official Gazette of the Andalusia Regional Government; for statistical data, the Agricultural Census, 1989, the Livestock Census, 1995, the Survey on the Structure of Farms (1987 and 1993) and the Annual Abstracts of Agricultural Statistics and the Monthly Agricultural Statistics Gazette, both published by the Spanish Ministry of Agriculture, Fisheries and Food (various years); data relating to farm aid was provided by the CIFA Department of Economy in Cordoba.

- *Primary information*: interviews with experts from the Andalusia Regional Government Department of Agriculture and from livestock-farming areas, together with questionnaires sent to certain livestock feed-producing and pharmaceutical companies and to those standard- and compound-feed producers based in Andalusia with the highest sales in 1995. The three laboratories included in the survey were the only ones known to produce medicines suitable for ecological livestock farming. The intention was to determine the progress of their homeopathic products, which are more in line with the quality objectives identified previously; these substances, when administered in small doses, produce symptoms similar to those of the disease being cured.

Consequently, the results of this analysis can neither be extrapolated nor considered statistically representative of the sector; nonetheless, the authors consider that they may be very useful in evaluating, during monitor-

(2) In this context, the new demands of society are shown through three global objectives: (i) quality of life; (ii) food safety; and (iii) less pollution. These general objectives translate into other more specific goals such as protection of the landscape and new urban models, health control of food and protection of waters and soil, respectively.

(3) Spain is divided for administrative purposes into 17 autonomous communities or regions.

ing, the suitability of measures aimed at achieving “quality” live-stock farming in the terms defined at the outset.

THE SITUATION PRIOR TO THE REFORM

Characterisation of the sector

In 1986, the cattle census in Andalusia numbered 530,158, i.e. 10.42% of the national herd. The cattle population was distributed in three different production systems according to the dominant type of production: dairy, beef or mixed. These systems have different strategies in terms of the degree of farm extensification, land use, land-tenancy regimes etc. Therefore, their situation in terms of “agro-environmental quality” was also different.

In the period between Spain’s accession to the EC (1986) and the entry into force of the CAP reform (1993), farmers in Andalusia opted for greater *specialisation*, as shown by the dramatic reduction in the number of mixed farms (**table 1**).

As regards *dairy farms*, the first signs of extensification had already begun to appear during this period, when the surface area per dairy farm increased by around 70%. The strategy of merging farms not only lead to an increase in average farm size but also to a 53% increase in the cattle population (**table 1**), coinciding with a decrease in the national herd. Dairy farmers opted to simultaneously increase farm size and production to compensate for the drop in milk prices from 1989 onwards (**figure 1**).

Beef farms continued to practice extensive farming, although their SAU fell by 15.8% in this period (**table 1**). Mergers were restricted to those farms with male animals of more than two years of age or dairy cattle. The herd also increased by 25.6% in this period (**table 1**), whereas production fluctuated slightly despite a small drop in prices from 1989 onwards (**figure 2**).

Finally, as regards *mixed farms* (dairy cattle and beef cattle), the reduction in both the number of farms and

animals was so spectacular —over 90% —that it would be no exaggeration to say that they almost disappeared with this specialisation (**table 1**).

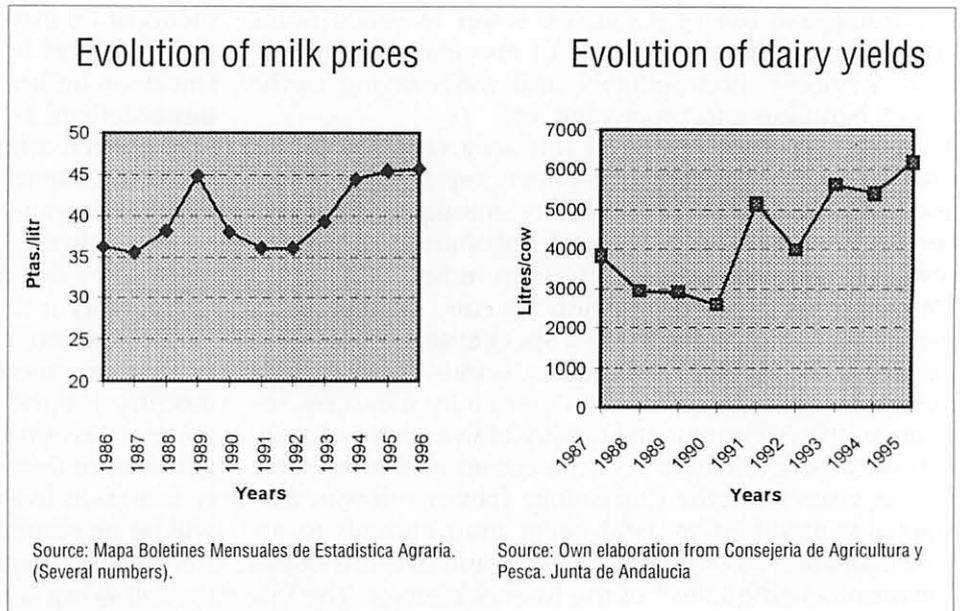


Figure 1 - Evolution of milk prices and dairy yields.

Table 1 Evolution of farms by technical orientation (TO).

TO	1987				1993			
	Farms	AUS (ha)	AUS/ Farm	Cows	Farms	AUS (ha)	AUS/ Farm	Cows
Beef	1,211	121,080	99.98	84,542	1,338	112,662	84.20	106,156
Dairy	3,865	36,111	9.34	75,692	2,351	37,633	16.01	115,835
Mixed	2,262	17,550	7.76	64,042	107	1,701	15.90	2,673

Source: INE. Encuesta sobre la Estructura de las Explotaciones Agrícolas 1987 y 1993.

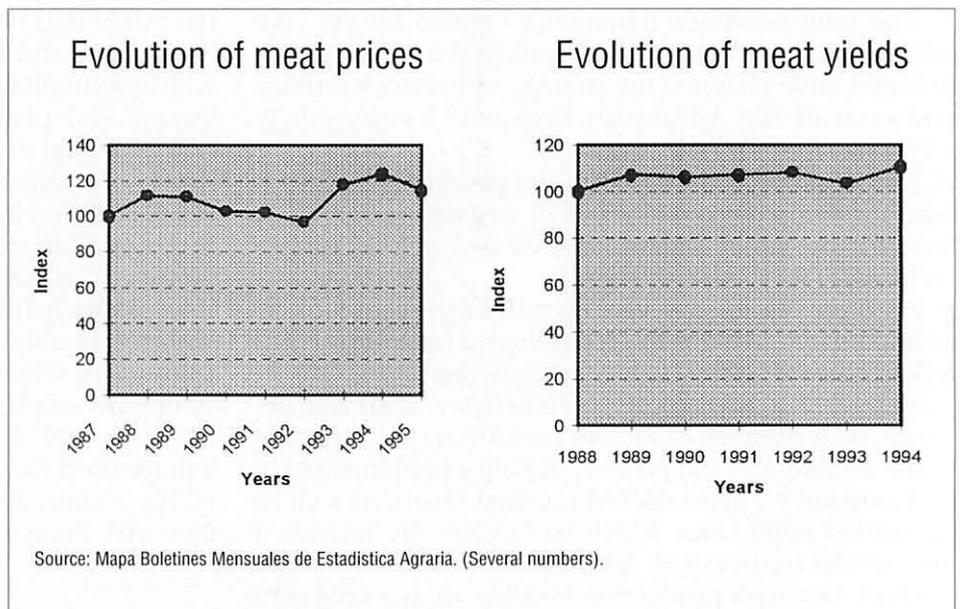


Figure 2 - Evolution of meat prices and yields.

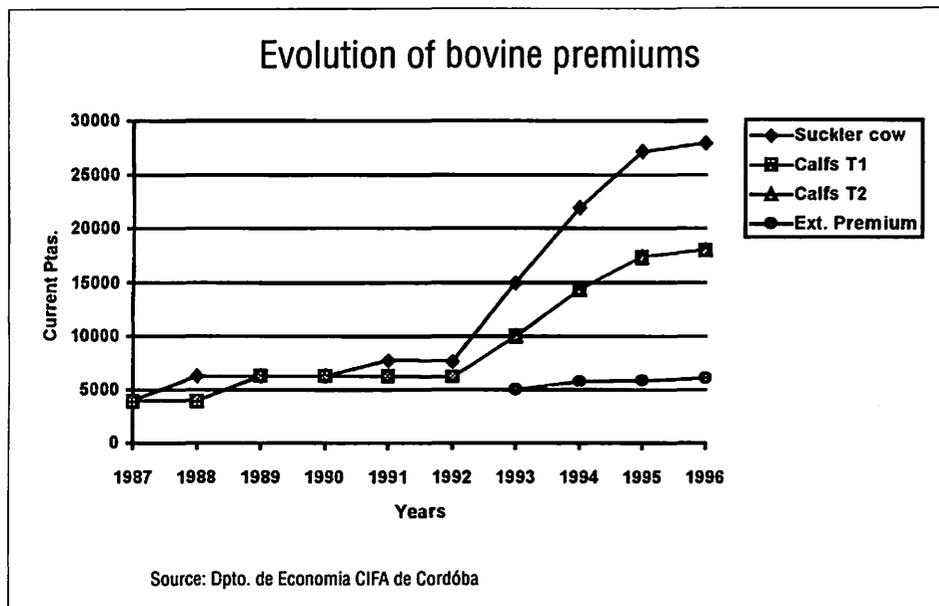


Figure 3 - Evolution of bovine premiums.

Despite the increase in farm size, in livestock production systems in the most representative livestock farming regions, the average number of animal units per farm between 1986-93 did not exceed 2.1 LU per ha. However, while livestock density in all these systems was not excessively high, those districts engaging mainly in dairy farming presented higher values, particularly the Pedroches district (Cordoba), where the land base was especially scarce, forcing farmers to lease more and more land in order to save on the purchase of cattle feed. Attention should be drawn to the fact that the overall regional area given over to meadows and pastures increased by almost 121% (table 2), possibly favouring the achievement of livestock farming practices more in line with the objectives of "agro-environmental quality".

External factors generated by cattle production

One major aspect of agro-environmental quality is the presence of negative external factors in the sector. The management of waste generated by livestock is one of the problems which must be resolved in order to achieve non-pollutant and non-aggressive production systems. Pollution generated by cattle mainly comes from dry and liquid manure that can be harmful to soil and water. Most contamination produced by dry manure comes from nitrate and phosphate emissions. Problems result more from the possible concentration of manure production in a restricted area and its inadequate storage than from the overall amount of manure produced in the

region. In Andalusia, annual manure production amounts to approximately 3,700,000 tonnes, which represents an average of 24.5 tonnes per ha of cattle farm (table 3).

However, as mentioned previously, great differences exist between dairy systems, which involve more intense use of land, and beef systems, which are more extensive. These factors are therefore responsible for the problems affecting dairy farming areas in the Northern Sierras of Cordoba and Seville. These provinces, together with Cadiz, are the main producers of manure in Andalusia, although the livestock burden in the predominantly beef producing region of Cadiz is much more balanced.

Liquid manure can contaminate soil and water with nitrates, phosphates and micro-organisms. Liquid manure from cattle in Andalusia produces 32,089 tonnes of nitrate and 12,836 tonnes of phosphate per year (table 4). The Biochemical Oxygen Demand, as an indicator of the level of water pollution by micro-organisms, stands

	1987	1993
Permanent meadows and pastures	92,000	203,113
Others meadows and pastures (poors)	961,341	967,278

Source: INE. Encuesta sobre la Estructura de las Explotaciones Agrícolas 1987 y 1993.

Livestock	Manure (t)	Charge Factor (%)		Total Charge(t/year)	
		Nitrate	Phosphate	Nitrate	Phosphate
Bovine	3,723,100	0.6	0.3	22,338.6	11,169.3

Source: Consejería de Medio Ambiente (1996) La Table Input Output Medioambiental de Andalucía 1990.

Livestock	No. of Animals	Liquid manure per head (kg/day)	Charge Factor (%)		Total Charge (t/year)	
			Nitrate	Phosphate	Nitrate	Phosphate
Production Bovine	345,044	49.2	0.5	0.2	30,981	12,393
Bait Bovine	21,158	28.7	0.5	0.2	1,108	443
Bovine total					32,089	12,836

Source: Consejería de Medio Ambiente (1996) La Table Input Output Medioambiental de Andalucía 1990.

Table 5 Gross charge of BOD₅.

Type of livestock	Charge (t/year)
Bait Bovine	3,706.6
No Dairy Bovine	54,263.5
Dairy Bovine	46,490
Total	104,460.1

Source: Consejería de Medio Ambiente (1996) La Table Input Output Medioambiental de Andalucía 1990.

at 104,460 tonnes/year, produced mainly by non-milking cattle (**table 5**). A comparison of total dairy-cattle waste dumped in water with the waste generated by the entire Andalusian population shows that dairy cattle account for almost half the microbial waste (48.5%), but only for 24% of phosphate and 34.3% of nitrate.

In view of the above, it would be reasonable to conclude that given the characteristics described in the previous sections, the situation of the livestock industry in Andalusia in the year of the CAP reform were good for achieving the new quality demanded by Community regulations aimed at achieving sustainable livestock farming.

APPLICATION OF AGRO-ENVIRONMENTAL REGULATIONS

Various initiatives which directly, or indirectly, affect the livestock industry are included within the scope of the Reform of the Common Agricultural Policy (CAP) approved by the European Council in May 1992. Three additional farm support measures were established, based on the reforestation of agricultural land (EEC Regulation 2080/92), farm retirement reforms (Regulation 2076/92) and the promotion of more environmentally-friendly production techniques (Regulation 2076/92); in addition, the beef CMO was modified (EEC Regulation 2066/92). The reform also furnished a whole series of environmental measures, some general and others aimed at improving health and hygiene on livestock farms; these measures are dramatically transforming the reference framework for the management of livestock farms. The objectives of these regulations include the following:

- The extensification of farms and reduction of production.
- The use of environmentally-friendly production methods.
- The promotion of endangered indigenous species.
- The control of additives in animal feeds and other substances given to animals.
- The promotion of ecological livestock farming.
- The training of farmers in the use of environmentally-friendly technology.

(*) Following publication on 20th January 1995 of Royal Decree 51/1995, and in Andalusia of the Order of 1st December 1995.

g) The improvement of farm condition.

One of the main developments of this regulation has been the transfer of funding responsibilities from the Guidance section to the Guarantee section of the EGAF; this represents a substantial increase in the contribution, in percentage terms, received from the European Union and a faster system of payment. The success of these accompanying measures has also come to depend more on the member-State governments and in this case, the Andalusia Regional Government. The Community contributes 75% to these accompanying measures for objective 1 regions (which include Andalusia) and 50% to other regional measures.

In order to be eligible for this aid, member States must establish a pluri-annual regional programme or simply a general regulatory framework for completion and introduction at regional level. In Spain, the decision was initially taken to present programmes at the request of the individual Autonomous Regions. However, in view of the large number of requests received, Central Government opted for a change in strategy: the Ministry of Agriculture, Fisheries and Food (MAFF) drew up a national programme of horizontal measures and a regional programme for selected areas. This entire process lead to a substantial delay in the application of these measures in Spain, thus having a significant effect on results. These programmes were only implemented three and a half years after the enactment of Regulation 2078/92^(*). The delay in the application of the national regulatory framework postponed its application in Andalusia until the end of 1995.

Table 6 Classification of subsidies.

Systematic subsidies

Production Subsidies
Transformation premiums for young male bovines
Management Subsidies
Improvement investments in cattle farm hygiene conditions and in life and work conditions
Agro-environmental Formation

Conditioned subsidies

Production Subsidies
Suckler cow premiums^(*)
Male bovine premiums^(*)
Subsidies for measures to develop agricultural productions methods compatibles with the protection or natural space
Water protection
Retraining of arable crop surface to extensive grassland^(*)
Extensification by surface enlargement^(*)
Decrease of stocking density per hectare forage area
Others
Ecological agriculture development
Development of livestock breeds in wipe out danger

(*) To receive this subsidies a limit of 2 LU/ha of forage area is settled down (limit not applicable to small farms with less than 15 LU). In addition, farms who receive this subsidies can have a supplementary premium if farm stocking density is less than 1.4 LU/ha of grassland surface.

(*) Only if livestock charge in the retraining surface is less than 1.4 LU/ha of forage area (Reg. 746/96).
(*) With an initial stocking density less than 4.5 LU/HA of forage area, and less than 2 LU/HA of forage area at the end of the first year, and if the stocking density is well distributed in the farm and the surface enlargement is not devoted to intensive forage area (Reg. 746/96).

Source: Elaboración propia.

Various types of aid are available to farmers in Andalusia, depending on the criteria used for determining eligibility:

- The first type of aid - **systematic** aid (**table 6**) - comprises aid to which they are eligible simply by virtue of being farmers.

- The second type of aid - **conditioned** aid (**table 6**) - comprises aid which is only awarded upon previous compliance with a series of conditions, mainly concerned with fundamental transformations on the farm. The conditions which must be fulfilled in order to be eligible for this aid are mainly concerned with reducing the livestock burden per ha, or at keeping this below 1.4 or 2.0 LU/ha, which, as stated previously, is a condition easily met in Andalusia.

The three most important types of aid belong to the group classified as *conditioned* aid, given the volume of funds allocated to each: the premiums for suckler cows, bulls and for the preservation of endangered indigenous species. The first two groups consist of aid which can be classified as reconverted into agro-environmental aid, since they were already available prior to the entry into force of the CAP reform; as far back as 1991, 181,890 requests for aid were received for suckler cows and 18,404 for bulls (**table 7**). The number of applications has increased in recent years since the premiums for suckler cows have increased substantially since 1993 (346% by 1996) following incorporation of the extensification premium. The same occurred with premiums for beef cattle (290% in the same period) (**table 7**).

In Andalusia, it could be said that almost all the requests for premiums for suckler cows are awarded, in addition to extensification premium, due to the low livestock population density, as shown, for example, by the aid awarded in 1994 (**table 8**). However, in the case of the bull premium, some farms do not comply with the density condition (2 LU/ha, the maximum eligible for aid). These farms only receive the premiums corresponding to the

number of animals which, depending on the size of each farm, comply with this limit. Although not agro-environmental in the true sense of the word, the funds allocated to premiums for suckler cows currently represent one of the most important items of aid, having increased since 1992 by more than 350%. This upward trend is expected to continue in the immediate future; according to the proposals of the European Commission agreed in the "Agenda 2000" document^(*), an increase is forecast from the current 145 Ecus/year to 215Ecus/year. According to our estimates, based on the number of requests, the overall amount of this aid represented 10% of the value of Final Livestock Production in 1994 and 12% in 1996 (**table 9**).

If we compare this volume of funds with the amount allocated to the four, more agro-environmental, measures established in Law 51/1995 for application in the Andalusia Region (**table 10**), the difference is fairly substantial. The projected aid for four years (1994-98) allocated to ecological agriculture and extensive farming, agro-environmental training of farmers and the protection of endangered species accounts for only 9% of funds allocated in the last four years to premiums for suckler cows. If to the amount allocated to suckler cows we add that corresponding to beef cattle and their

(*) A document in which the Commission has considered a series of proposals concerning the new CAP.

Table 8 Total funds for suckler cow premiums (Campaign 1994).

Province	No. of cows			Total transferred (Pesetas)
	Paid	Denied	Pending	
Almería	3	2	157	64,587
Cádiz	46,409	0	19,291	1,257,469,697
Córdoba	20,000	106	9,290	549,005,981
Granada	2,862	11	941	78,355,019
Huelva	19,301	667	6,219	527,641,837
Jaén	8,943	204	3,057	245,390,754
Málaga	3,622	0	1,642	96,285,381
Sevilla	21,057	248	14,066	574,625,404
Andalucía	122,197	1,238	54,663	3,328,838,660

Source: C.A.P. La Agricultura y la Pesca en Andalucía en 1994. Sevilla.

Table 7 Evolution of premium applications.

Year	No. of Suckler Cows	No. of calfs
1990	N.A.	17,489
1991	181,890	18,404
1992	202,227	30,239
1993	199,764	34,119
1994	193,713	29,958
1995	198,774	S.D.
1996	207,549	S.D.

N.A. Non Available.
Source : Dpto. Economía del CIFA de

Table 9 Estimated evolution of funds for suckler cow premiums.

Año	Amount of money for suckler cow premiums (Millins of Ptas.)
1991	1401.8
1992	1537.5
1993	3981.1
1994	5347.4
1995	6544.8
1996	7039.2

Source: Own elaboration from datos del CIFA de Córdoba.

Table 10 Expense Distribution for horizontal measures in Andalucía^(*).

Measures	Units	Mediun Annual Cost (Mill. Ptas.)	% of cost with regard to the national total
Extensive Agriculture	313,348 (ha)	1,646.9	13.62
Biological Agriculture	5,795 (ha)	202.8	22.00
Breeds in wipe out danger	11,493 (LU)	92.3	17.45
Formation		102	15.93
Total		2,044	13.13

(*) This distribution of funds belong to the 1994-1998 period, i.e., one more year than the approved period in the communitary decision (1994-1997), due to the application delay in Spain. This is the reason of using the estimated average cost for a year in which the number of solicitudes reaches a normal level. The effects of this programs are not yet detectables.
Source : Programa español de medidas agro-medioambientales.

transformation, a figure which is more difficult to quantify, the difference would be even greater. This reveals the scarce importance attached to date to agro-environmental measures in terms of traditional aid, although these are currently being reconverted.

THE RESULTS

The current situation of livestock farming in Andalusia in terms of the objective of greater environmental quality, the goal of all the Community measures described previously, can be examined on three levels:

- a) The cattle sector
 - b) The *amont* industries of the sector, and
 - c) The Regional Government itself
- a) *Situation of the livestock production sector*: according to data from the livestock census, the cattle population in Andalusia fell from 10.42% of the national herd in 1986 to only 9.48% in 1995. As stated previously, this downturn is due to the decrease in the number of dairy cows.

As regards *milk production systems*, which are particularly intensive, it would be reasonable to say that remaining cattle farmers are still motivated mainly by increasing productivity in order to be competitive. The most widely-used strategy is intensification, instead of extensification, since direct experience has shown that intensive farming practices have thus far generated high incomes, by taking advantage of economies of scale in order to compete. Cows are treated as "*machines for producing milk*" and their main raw material is food. Feed strategy therefore plays a crucial role here. In the most representative milk-producing areas (the Pedroches Valley), the lack of a territorial base coupled with low-output and poor-quality pastures mean that feed must be purchased outside the farm, thus highlighting the importance of the feed-supply sector for the future of these systems. In fact, in order to reduce feed costs, land is leased to produce fodder and thus reduce feed purchases.

(⁶) Flooding of installations due to the accumulation of manure and liquid manure.

Problems affecting these livestock systems, with no territorial base, are caused by the overcrowding of animals and subsequent deterioration of the living conditions of cattle, as well as by damage caused by waste storage, which may limit future milk production in specific areas; underground water (extracted for supplying cattle) contaminated by nitrates, as a result of manure storage in the lowest parts of farms, has been detected in some areas. In these cases,

manure is used as crop fertiliser on the farm itself, given away or sold. However, all manure reaches the soil as basal dressing, often without taking into account the real needs of the soil due to farmers' lack of training in this regard. Since this task is performed at a specific time of year, in some cases manure accumulates almost one year before it is used. Although not a widespread problem, soil contamination is a fact which must be taken into account in those areas where problems have been detected concerning the loss of holm oaks on pastures, a system closely linked to that of livestock.

E. coli contamination problems also affect water near intensive farms where there is a poor drainage of liquids. These aspects must be highlighted since many improvements have yet to be made, particularly in the case of *sludge*⁽⁶⁾ in installations (especially in winter) which create considerable focal bacteriological contamination. Greater efforts have to be made in terms of training farmers in this respect.

These problems of contamination due to poor waste management are largely due to the fact that manure storage tanks and decantation apparatus have not been obligatory until now. Farmers also have no intention of investing in this equipment for the following reasons: 1) they believe that the same situation will arise as with the regulations governing slaughterhouses, where a great deal of flexibility was required in order to avoid the closure of many slaughter houses; 2) the regulations governing the standardisation of dairy cattle farms set parameters which are far too ambitious and ambiguous (*easily-cleaned surfaces, optimum non-stress conditions* etc.); and 3) they require substantial investments since very large tanks are needed. In view of these attitudes, farmers would have to be provided with cheap technology in order to prevent contamination or steps would have to be taken to ensure that aid for such structural improvement of farms were truly effective.

The situation regarding *beef production systems* is somewhat different; although the cattle population has actually increased, this is not of concern from the standpoint of environmental quality, since beef-cattle farming does not present significant problems. In Andalusia however, ecological livestock farming based on indige-

nous breeds is feasible. However, the development and strengthening of these breeds, in areas with favourable conditions for such development, face different problems, including the following:

— i) In current meat markets, ecological products guaranteeing the quality/health of meat are not profitable enough to encourage farmers to opt for production systems promoting integral health. However, consumers still lack sufficient information to be able to value the nutritional properties of these products. A change in diet would be needed to make the price of these meats profitable for farmers. There are also no financial incentives for those responsible for maintaining biodiversity through the rearing and preservation of indigenous breeds. On the contrary, farmers find it extremely difficult to convince slaughterhouses and fattening plants to purchase such cattle, given their lower level of transformation and meat conformation (i.e. carcass conformation which is difficult to handle). This means that despite there officially being no lower prices for these animals, farmers are penalised with price reductions of as much as 80-100 ptas./kg, negotiation of the price depending largely on the bargaining power of the parties involved.

—ii) Current aid is not sufficient to persuade farmers to change their herds and herd management techniques. Aid for preserving endangered cattle breeds only account for the equivalent of 0.1% with respect to the value of beef production and therefore only a very small portion of total income. Consequently, when more profitable alternatives (reforestation) to unproductive agricultural land, the aid for which is profitable for the owners of such land, livestock is substituted by forests. This may lead to the disappearance of indigenous breeds with the subsequent loss of biodiversity.

As regards health, it is still too early to say whether the entire herd is healthy, despite considerable progress having been made in recent years. This is a very expensive process, since new diseases continually appear, sometimes transmitted by animals imported from other Community countries where EU controls are not as stringent as those applied to animals from non-Community countries.

b) *Sector-related industries.* The most important players in these industries are the suppliers of animal *feed and pharmaceutical products*. Feed suppliers, particularly the co-operatives, are modifying the composition of their products, not as a result of the new environmental regulations, but in order to bring prices down and increase milk production. This strategy consists of incorporating sub-products from the local food industries (all vegetable products with the exception of unsaturated fats), provided that these have a positive effect on milk production, and involves making the most of economies of scale in order to be in a position to compete with other milk producing areas with better

natural resources.

The demands of the environmental objectives might suggest that those strategies will be modified. However, the enterprises interviewed here presented certain contradictions in this respect; 87.5% considered that the environmental measures would not affect demand for these products and all believed that the sector would not require restructuring. However, the majority (85.7%) also believed that considerable research is required in order to develop new types of cattle feed. According to 57.1%, these products would succeed in the market since they would have to adapt to the new production systems, unlike feed produced at present which does not comply with regulations governing this type of livestock.

Opinions are divided with respect to the extent to which the promotion of ecological livestock farming and general extensification of productive systems may affect feed demand; in the opinion of some farmers (42.9%), this will lead to a slight decrease in feed demand, whereas others (42.9%) believe that it will not affect demand; the remainder consider that there will be a moderate increase as a result of the application of these measures. The majority (57.1%) believe that measures encouraging the abandonment of livestock farming will also lead to a substantial decrease in feed demand.

Overall, most enterprises do not consider that current agro-environmental regulations will place significant demands on them with regard to the use of certain raw materials, technology for end products, and the sale, promotion and distribution of products etc. Nor do they foresee drastic modifications in terms of the typology of consumers or the geographical distribution of demand. Only 28.6% forecast moderate changes in technology, end products and in sale and distribution, although they do not specify what the changes will be.

It can therefore be concluded that feed producers in this region have not yet begun to feel the full effects of the different agro-environmental regulations governing livestock farming. Consequently, these enterprises are not greatly concerned about the way in which these measures may modify feed consumption and are unwilling to change their production structures. There may be two fundamental reasons for this attitude, although it is probably a combination of two factors: a) the lack of any real impact of these measures on current livestock production and b) the belief that these measures will not significantly alter future livestock production and, therefore, demand for their products.

Another key element in this campaign to achieve quality products that guarantee health safety are *additives* or *finalisers*. The seriousness of this problem stems mainly from the difficulties involved in preventing the use of these products; since carcass yield is lower when additives are not used, processing industries do not seem in-

terested in preventing the use of additives. However, as in the case of milk producers, these industries should take responsibility for controlling their use. There are also enormous economic interests behind additive production (the chemical/pharmaceutical industry). Farmers are far too often unaware of the products they give to their animals⁽⁷⁾.

One indication of the lack of progress in the control of artificial additives is the scarce development of other types of pharmaceutical products for livestock, such as those for consumption by ecological livestock. These products are homeopathic and unique in that they leave no residue in meat or dairy products and do not alter the physiological processes of the animals, with the exception of those affected by disease. Demand for these products has increased slightly in recent years and is forecast to rise sharply in coming years, which has prompted greater research in this area. According to the laboratories interviewed here, the projected evolution of these products for ecological livestock may broaden the range of permitted veterinary products and lead to their more widespread use in all types of livestock farming, including ecological livestock farming. As a result, veterinarians, who currently represent a small section of demand, will join livestock co-operatives and become mid-range consumers. Today, the greatest demand comes from individual cattle farmers, mainly in northern Spain (Cantabria, Galicia, Gerona and Lerida), which shows that their interest responds more to individual than collective initiatives.

a) *The Regional Government*: One of the effects of the new Community agro-environmental regulations has been to raise the awareness of the Regional Government with respect to the agro-environmental quality of livestock farms. The results of this concern have translated into a whole series of measures introduced by the Andalusia Regional Government aimed at improving livestock health and hygiene, together with various aid programmes which we have called *systematic* aid programmes.

One major measure is aimed at *improving product*

quality, from milk handling⁽⁸⁾ to the health of the cattle herd. One of the challenges facing the dairy sector in Andalusia is that of achieving the demands in respect of milk "quality" for sale in all countries of the EU⁽⁹⁾. In March 1997, the Andalusian Regional Government Department of Agriculture launched an information and monitoring campaign aimed at encouraging farmers to adopt suitable measures and to comply with quality requirements relating to animal health, health and hygiene on farms and the quality and healthiness of milk⁽¹⁰⁾.

The strategy pursued by the Department of Agriculture is based on the following assumptions: i) if the final product fulfils quality requirements, so do the farms; and ii) the farmer will be fully reimbursed by the dairy industries, which will only accept milk which meets all the quality requirements and at prices that specifically reward the degree of quality. Experience also suggests that the response of farmers to the demand for "quality" milk is more positive if this is linked to price, or to non-collection, than to any other incentive.

Spanish and/or Community authorities will be responsible for controlling the collection and standardisation centres and the treating and transformation plants. They should therefore be the most concerned with only receiving milk that complies with Community regulations. Farmers in Andalusia will be required to either comply or abandon, since large farmers and enterprises will be able to obtain supplies from any area of the EU that fulfils regulatory quality conditions. In order to ensure that farmers are able to standardise their farms, the Regional Government has decided to boost training.

As regards the animal health programmes, attention should be drawn to the special Plan for combating epizootic parasites⁽¹¹⁾, involving average annual expenditure of somewhere in the region of Ptas. 1,500 million between 1992 and 1994 on compensating farmers for the sacrifice of 64,810 cattle. All indications are that there has been a significant decrease in the incidence of disease in animals and no increase in tuberculosis, brucellosis and leukosis on farms. As regards peripneumonia, the situation in Andalusia remains satisfactory, no cases of this disease having been diagnosed in the region.

Despite all these government-lead initiatives and the substantial improvement in health, at the beginning of 1997 only half of the dairy herd complied with the conditions established by EEC Directive 92/46 for the beginning of 1998. For this reason, in 1997 the Regional Government made a final attempt to redress the traditional unwillingness of farmers to incorporate changes in health and hygiene on farms and ensure that they guarantee the quality demanded by Community regulations and consumers. It also offered support to the collecting industries by encouraging them to impose restrictions on the acceptance of milk. The aim is for 90%

(7) The Committee of Agriculture and Fisheries of the Andalusia Regional Government, in co-ordination with the Department of Health, has been developing, within the scope of the National Plan for Waste Research, an annual monitoring and control programme for farms and slaughterhouses focused on determining the use of various banned or restricted substances in animal production, with the aim of detecting anomalies in fresh meat and in animals.

(8) Experimental programme to promote the control of milking machines and official control of milk yield.

(9) Directive 92/46/EEC on health conditions applicable to the production and sale of raw milk, heat-treated milk and dairy products.

(10) Royal Decree 1679/1994 of 22nd July 1994. Official State Gazette published 24th September 1994, on the conditions which must be met for standardisation by 1st January 1998.

(11) This concerns livestock health campaigns, aimed at eliminating tuberculosis, brucellosis, leukosis and peripneumonia. They are based on two main actions: firstly, the screening of all animals susceptible to these diseases with subsequent sacrifice of affected animals; and secondly, vaccination of young cows against brucellosis.

of the milk herd to comply with the "safe" regulations by the end of the year (two examinations with negative results). However, it is doubtful that such an ambitious objective will be achieved, since the results of this plan will not be immediate due to the delayed reaction of both the Government and the sector.

CONCLUSIONS

In response to all the questions raised at the beginning of this paper, and based on the comments made in the previous sections, the main effect of Community regulations aimed at achieving greater agro-environmental quality in livestock farming in Andalusia has been to raise the awareness of experts working in the sector and in Agricultural Departments in Andalusia. However, the results in terms of changing the strategy adopted by farmers fall far short of expectations.

The achievement of "environmental quality" in livestock products is still not enough of an incentive for most dairy farmers, who continue to increase productivity. Their attitude is explained by the fact that even the regulations themselves, in the case of aid not requiring farmer compliance with certain conditions, distort the type of production on farms and make it more difficult for them to achieve environmental objectives, since the funds allocated to this aid exceed those allocated to other types of aid aimed more at improving environmental quality.

Furthermore, aid is awarded according to the adoption by farmers of more environmentally-friendly production methods and techniques which generally produce lower yields. One important obstacle to the implementation of conditioned measures, such as those aimed at protecting indigenous breeds, is the lack of experience of farmers with this type of aid; farmers often fail to comply with stipulated conditions. It is therefore essential that farmers be continually informed in this respect. Agro-environmental aid established to date compensates for losses incurred in bad years (as a result of drought), but not those generated by lower productivity following the changeover to more extensive farming systems in the case of milk, or to indigenous breeds in the case of beef cattle.

They represent only a small portion of income for farmers, who prefer to increase herd size, thus foregoing aid dependent on herd reduction.

As regards beef-cattle farms, no markets provide sufficient profit for their products, guaranteeing integral health, no contamination and the maintenance of biodiversity (indigenous breeds); this hinders the positive response of farmers to regulations encouraging the implementation of these production systems.

Information to consumers is crucial for replacing current demand for non-qualified cattle products (commodities) both in Spain and in Andalusia with a more selective system of quality (attributes) and higher prices

to reward environmental products produced by farmers.

Results have also failed to fulfil expectations due to the sluggish development of agro-environmental regulations in Spain in general, especially in Andalusia. Certain aspects of these regulations are sometimes unknown, even by the local governing bodies such as the Provincial Councils, whose representatives claim that they are incoherent, complex and exhaustive. Good information is considered essential for achieving the transformation of the sector, since it is a well known fact that the better trained and informed farmers are the first to incorporate new ideas in environmental areas. Experts generally feel that the sector is highly dynamic and can respond well if it is informed correctly, particularly the dairy farming sector, where farms are usually family-run and therefore more inclined to hold on to what is their own.

Extensive cattle farming tends to be ecological and Andalusia has the potential conditions for its development. Disease control is not a problem in extensive farming areas; the greater the extensification, the lower the risk of disease, thus avoiding the need to treat animals with pharmaceutical products.

Furthermore, since the beef industry hardly processes the product, this does not lose its properties during quartering, freezing etc., provided that it has been prepared in accordance with ecological criteria, unlike certain vegetable products.

Nevertheless, it should be borne in mind that the transformation of meat production systems in Spain into ecological livestock farming systems must be gradual, since massive demand for beef tends to be dictated by price and health safety considerations⁽¹²⁾, as opposed to the environmental quality of production systems. It would also be difficult to satisfy this demand with ecological products, since their prices are logically much higher. In conclusion, the measures aimed specifically at achieving the extensification of the cattle population or at achieving ecological livestock farming do not seem to have had much influence on farm strategy, since these measures are recent and have a scarce impact on income, representing more a support to income derived from traditional production rather than an alternative source of income.

Nevertheless, they have managed to increase awareness in agricultural circles in the Andalusian government and among experts in the sector with regard to the problems relating to health and hygiene of animals and installations, as well as the quality/safety of products. This may be the first step. ●

⁽¹²⁾ Awareness in this respect has increased spectacularly, boosted by the BSE crisis, which may signify greater impetus in changing consumer demand to reflect the need for recognition of these production characteristics.