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Economic diversity of farming systems and possibilities for structural adjustment in mountain livestock farms

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SUMMARY – Livestock farming systems have been studied in Spanish less favoured mountainous areas. Farming activities require an adequate return to labour and also public subsidy policies if the new environmental functions assigned to these areas under CAP are to be fulfilled. Under an hypothetical scenario of zero subsidy, the great diversity among farms would produce different responses. A sample of livestock farms of a representative Pyrenean area was typified from the point of view of the economic and structural characteristics, using multivariate statistical methods (principal component analysis and cluster analysis). Relationships between herd size, performance and labour productivity are particularly noticeable. Productive orientation of farms is the variable that most differentiated the types obtained. Large cattle farms obtained the highest outputs of farming activities, whereas non-transhumant sheep farms obtained the lowest. Under the current subsidy conditions, all types of farms were profitable. Nevertheless, when subsidies are not taken into account, 38% of sample farms obtained negative economic results, especially transhumant sheep farms and mixed sheep-cattle farms. Cattle farms obtained better economic results.

Key words: Livestock farming systems, mountain areas, economic results, policy of subsidies, structural adjustment, sheep-cattle.

RESUME – *"Diversité économique des systèmes d'élevage et possibilités d'adaptation structurelle dans des exploitations d'élevage en montagne". On analyse les activités d'élevage dans les régions de montagne considerées comme zones défavorisées. La viabilité des exploitations est indispensable pour atteindre les nouvelles fonctions attribuées aux activités agricoles en montagne. Cette viabilité est conditionnée principalement par la productivité du facteur travail et par les politiques agricoles. Dans l'hypothese d'absence de subventions aux zones de montagne, l'impact sur les exploitations serait très variable à cause de la diversité des exploitations. On a fait une typologie sur variables de structure et d'économie des exploitations au moyen d'une analyse en composantes principales et d'une classification automatique. Puis on a calculé d'autres variables économiques et le seuil de rentabilité pour approfondir l'analyse économique des exploitations et leurs possiblités d'adaptation structurelle. On a trouvé des relations entre la taille de troupeau, les résultats des exploitations et la productivité du travail. Les différences entre les types obtenus sont determinées par l'orientation de la production. Les résultats les plus élevés sont obtenus par les exploitations bovines de grande taille et les plus bas par les exploitations ovines qui ne font pas de transhumance hivernale. Dans la situation actuelle tous les types ont une taille de troupeau au-dessus du seuil de rentabilité. Toutefois 38% des exploitations seraient au-dessous du seuil sans subventions. Il s'agit principalement des exploitations ovines transhumantes et des systèmes mixtes. Les exploitations bovines se trouvent dans une meilleure situation.*

Mots-clés *: Systèmes d'élevage, montagne, résultats économiques, mesures de protection, adaptation structurelle, bovin-ovin.*

Introduction

The economic development of developed countries has led to the decline of agriculture in the less favoured areas. Technological innovation has not been taken on board to the same extent in mountain farms as in other areas. As a consequence of intensification, the rise of productivity has further increased differences between lowland and mountain areas. The physical environment and the general socio-economic handicaps of these areas have lead to limitations in performance potential, productivity and the capacity to accumulate capital (Bazin, 1990; Hulot, 1990) and have decreased the incomes of the farmers (Boutonnet, 1993). Due to lower production costs in lowland areas, production systems in mountain areas can not be competitive in the marketplace. Moreover, agribusiness development has homogenised food products, reducing farmers' income (Bazin, 1983) and questioning their viability.

The decline of agriculture in mountain areas has been accompanied by changes in farming systems and the use of pastoral lands, bringing about difficulties in the maintenance of the environment. Livestock activities in these areas help to make the pastoral and farming areas more profitable and contribute to the maintenance of rural populations. The long-term viability of these farming systems depends on the return to labour (Tirel, 1992) and total family income. Therefore, the future of farming activities and the maintenance of mountain landscapes, would seem to be linked not only with the improvement of the farming systems, but also with the existence of policies that can compensate for the poor generation of capital on farms (Olaizola *et al.*, 1993).

Farms have multiple relationships between different subsystems and with the physical and socio-economic environment (Osty, 1978). Farmer's decision making process is determined by the aims of the family together with different constraints, i.e. scarcity of factors of production (Tirel, 1992). Agricultural policies have an increasing influence on farming systems and contribute to define their behaviour and evolution.

In less favoured areas, as in European agriculture as a whole, agricultural policies have been protective. The peculiarities of mountain areas have warranted the attention of the CAP since 1975 (Directive 268/75). The current approach of EU policies does not differ from that of the Commission in 1988 (ECC, 1988). The reformed CAP assigned a conservation role to mountain farming, implying their specialisation as places for leisure and natural reserves (ECC, 1991). Farmers would become "Nature wardens", since they are not competitive as food producers (Muñoz Zamora and Estruch, 1993).

Despite economic inefficiency of these farms, a certain number have to be maintained if the rural population and activities are to be conserved. This would result in adapting current livestock farming systems to make them more extensive. This would be difficult because these systems are already very extensive and have low productivity (Lherm *et al.*, 1988).

To develop tourism activities and maintain the rural environment it is necessary to implement policies that compensate for the natural and structural handicaps of farms. Nevertheless, these socio-economic policies have been criticised with regard to their capability of reduce regional differences (Bazin, 1988) and their low effect on farmers incomes (Olaizola *et al.*, 1993).

The maintenance of agricultural policies that are essential for the viability of farms in a competitive economic context is still uncertain. In a non-protected economic environment, most farms would have to confront problems when facing competitors and important structural changes would be necessary. Nevertheless, it has been shown that a non-protected scenario does not necessarily means changes as predicted by Economic Theory (Manrique *et al.*, 1994a,b), and various responses have been produced in the past, depending on the characteristic of the farmers involved (Etxezarreta *et al.*, 1989; Sumpsi, 1989; Tio, 1989). It is necessary to consider the different structures of family income and the presence of non-farming activities (Arnalte, 1989), since the behaviour of European agriculture can only be understood in terms of family economics and not farm economics (Delord and Lacombe, 1990). The reduction of public grants may have a special impact on regions of low productive farming with few alternative employment possibilities, where the adaptation of the systems would be difficult. This process would increase the marginalisation of large rural areas.

The diversity of farms and systems is well known, even within limited areas. Mountain farms show different structures, functional schemes and dynamics (Gibon, 1981; Revilla, 1987). Moreover, farmers' decision making is influenced by: the availability of factors of production; physical and socio-economic local environment and various sociological and subjective circumstances. This diversity of farm circumstances has resulted in different possibilities and reactions to agricultural policy decisions.

The objective of this work is to characterise the livestock farming systems in a Spanish mountain area from the point of view of their economic characteristics. The relationships between the productive orientation, the level of grants received by farmers, the level of intensification and the formation of farm incomes are specially considered. From data on labour productivity, land productivity and farm productivity, adaptation strategies have been analysed for each type of farms. Finally to achieve positive economic results, the break-even point of herd size (total livestock units, TLU) has been calculated for each type in a no-grant scenario.

Methodology

An analysis based on the economic characteristics of farming systems in the Central Pyrenean valleys of Baliera-Barravés, Benasque and Broto (Aragón, Spain) was carried out (Fig. 1). The information was obtained by direct interviews to farmers on both technical and economical characteristics of the farms (year 1991-1992). A sample of 114 farms was analysed by means of multivariate statistical methods (principal components analysis and cluster analysis). Thirteen variables referring to productive orientation, economic results, costs, level of intensification, productivity and profitability were used in the analysis (Table 1). Twelve types or groups were obtained (Fig. 2). The characteristics of the types are shown in Tables 2, 3 and 4.

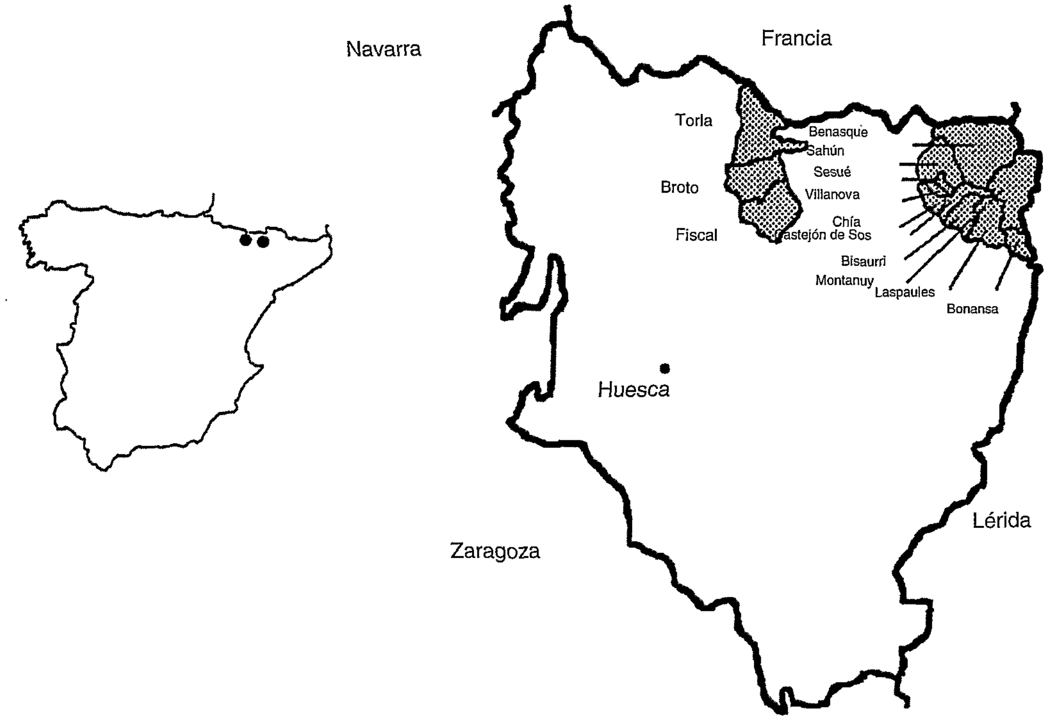

Fig. 1. Localization of area studied.

Table 1. Variables used in the farms typology

Productive orientation	Productivity
Lamb output % total	Family farm income[††]/family working unit
Milk output % total	GM/ha utilized agricultural area (UAA)
Inputs	GM × 100 ptas current assets
Purchase feed inputs % total	Intensification indicators
Variable costs % total	ha UAA/annual working unit (AWU)
Transhumant inputs % total	
Economic results	TLU/ha forage area
Gross margin (GM)[†]	Total inputs/ha UAA
	Livestock specific costs/TLU

[†]Output (crops, livestock and products) + subsidies – intermediate consumption
[††]GM – depreciation = farm net value added – (wages, rent and interest paid) = farm family income

To assess the productivity of farming, 3 indicators were calculated: productivity of labour [farm net value added (FNVA)/annual work unit (AWU)]; productivity of the farm (FNVA) and productivity of land [FNVA/ha utilized agricultural area (UAA)]. To analyse the evolution (level of adjustment) of farms, the increment of TLU per work unit was considered. Finally, the increase of FNVA per ha UAA indicated the intensification process of the farms.

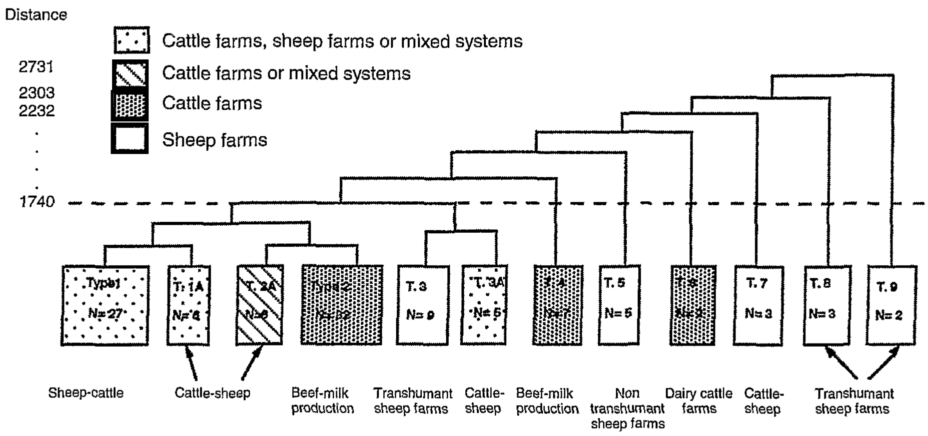

Fig. 2. Dendrogram of economic typology of farms.

Table 2. Structural and economic characteristics of the sheep farms. Average of the different variables

Type	T. 3	T. 5	T. 8	T. 9
Sample farms	9	5	3	2
Structural characteristics				
Number of ewes	680	532	897	850
Number of cows	15	5	0	0
Forage area (ha)	74	19	29	13
Productive orientation				
Lamb output % total	88	85	93	100
Milk output % total	0	0	0	0
Calf output % total	10	14	2	0
Transhumant inputs % total	36	23	54	68
Inputs				
Purchase feed inputs % total	20	29	16	10
Variable costs % total	79	78	91	94
Intensification indicators				
ha UAA/AWU	37	10	20	11
TLU/ha forage area	2	6	5	10
Total inputs/ha UAA	102	258	160	397
Livestock specific costs/TLU	35	34	29	43
Economic results				
GM (000 ptas)	3,193	1,774	5,663	3,993
Family farm income (000 ptas)	2,091	597	5,038	3,508
Productivity				
GM/AWU (000 ptas)	1,760	1,278	3,709	2,373
Family farm income/family working unit (000 ptas)	1,272	768	3,480	2,558
GM/ha UAA (000 ptas)	57	165	188	227
GM x 100 ptas current assets	120	105	170	59
Inicdence of current grants				
Sheep annual premium % current grants	92	94	96	99
Current grants % GM	95	117	61	88

Table 3. Structural and economic characteristics of the mixed systems. Average of the different variables

Type	Mixed systems sheep-cattle			Mixed systems cattle-sheep	
	T. 1	T. 3A	T. 7	T. 1A	T. 2A
Sample farms	27	5	3	6	6
Structural characteristics					
Number of ewes	168	239	235	183	88
Number of cows	9	28	19	23	20
Forage area (ha)	24	49	145	58	11
Productive orientation					
Lamb output % total	57	46	72	37	22
Milk output % total	6	0	0	0	15
Calf output % total	29	34	23	53	58
Transhumant inputs % total	0	2	10	1	0
Inputs					
Purchase feed inputs % total	36	30	52	30	50
Variable costs % total	71	71	79	69	68
Intensification indicators					
ha UAA/AWU	16	39	130	35	7
TLU/ha forage area	2	2	0	1	3
Total inputs/ha UAA	69	36	21	44	158
Livestock specific costs/TLU	21	13	35	19	27
Economic results					
GM (000 ptas)	1,264	4,261	1,864	2,653	1,749
Family farm income (000 ptas)	713	3,591	1,326	1,754	914
Productivity					
GM/AWU (000 ptas)	793	3,141	1,655	1,658	1,189
Family farm income/family working unit (000 ptas)	468	2,693	1,201	1,105	644
GM/ha UAA (000 ptas)	64	97	13	50	176
GM x 100 ptas current assets	161	375	119	189	181
Inicdence of current grants					
Sheep annual premium % current grants	61	68	79	45	39
Current grants % GM	68	30	63	35	29

To calculate the break-even point (point at which total income equals total costs), we considered linear functions for incomes and costs. The costs function was defined by:

$$TC = FC + VC(x)$$

were TC is total costs; FC is fixed costs and VC(x) is variable costs.

FC were calculated at farm level and variable costs were calculated per LU.

The function for income was:

$$I = TO(x)$$

were I is the farm income and TO(x) is total output calculated per LU. It includes grants and sales of milk, calves, sheep and other livestock products. The total grants received by farmers were considered to be proportional to the number of LU.

Table 4. Structural and economic characteristics of the cattle farms. Average of the different variables

Type	T. 2	T. 4	T. 6
Sample farms	32	7	2
Structural characteristics			
Number of ewes	7	47	0
Number of cows	27	61	29
Forage area (ha)	25	34	33
Productive orientation			
Lamb output % total	1	5	0
Milk output % total	42	34	79
Calf output % total	47	51	18
Transhumant inputs % total	0	0	0
Inputs			
Purchase feed inputs % total	41	51	71
Variable costs % total	70	70	88
Intensification indicators			
ha UAA/AWU	15	15	22
TLU/ha forage area	2	3	0
Total inputs/ha UAA	69	161	127
Livestock specific costs/TLU	28	43	102
Economic results			
GM (000 ptas)	2,319	5,605	2,322
Family farm income (000 ptas)	1,690	4,295	1,530
Productivity			
GM/AWU (000 ptas)	1,318	2,655	1,548
Family farm income/family working unit (000 ptas)	995	2,390	1,020
GM/ha UAA (000 ptas)	105	212	72
GM x 100 ptas current assets	243	199	71
Inicdence of current grants			
Sheep annual premium % current grants	6	12	0
Current grants % GM	13	13	13

Results and discussion

Productive orientation, current grants and farm income

The best economic results [gross margin (GM) and family farm income] are obtained by transhumant sheep farms (Types 8, 9 and 3), specialised cattle farms with a large number of cattle (Type 4) and mixed sheep-cattle farms focused on meat production and with large number of LU (Type 3A). The lowest incomes are obtained by small non-transhumant sheep farms (Type 5), most of mixed types (Types 1 and 2) and the intensive milk production type (Type 6). Farm income appears to be clearly related to herd size. These results confirmed the frequently observed relationship between farm size and both costs and income (Bazin and Chassany, 1985).

The types with the highest farm income have also have the greatest productivity of family labour (FNVA/family AWU). Only five types had higher incomes than the average reference income established by Spanish government in 1992 (average annual gross salary of non-agrarian workers in 1992, 2.14 million pesetas). Specialised milk farms showed low labour productivity, but the lowest figures correspond to the mixed sheep-cattle types and to the non-transhumant sheep type. In general, the return to labour decreased from the specialised transhumant sheep types to the mixed sheep-cattle (Tables 2, 3 and 4). A similar tendency was observed for GM and family farm income.

Current grants, especially the sheep annual premium (SAP), were responsible for the highest income in the large size transhumant types (Types 8 and 9) (Fig. 3). Nevertheless, income coming from sales of products from sheep farms was very low and many would be unprofitable without subsidies. Specialised cattle farms with largest herd size obtained the best economic results when the current subsidies were not considered.

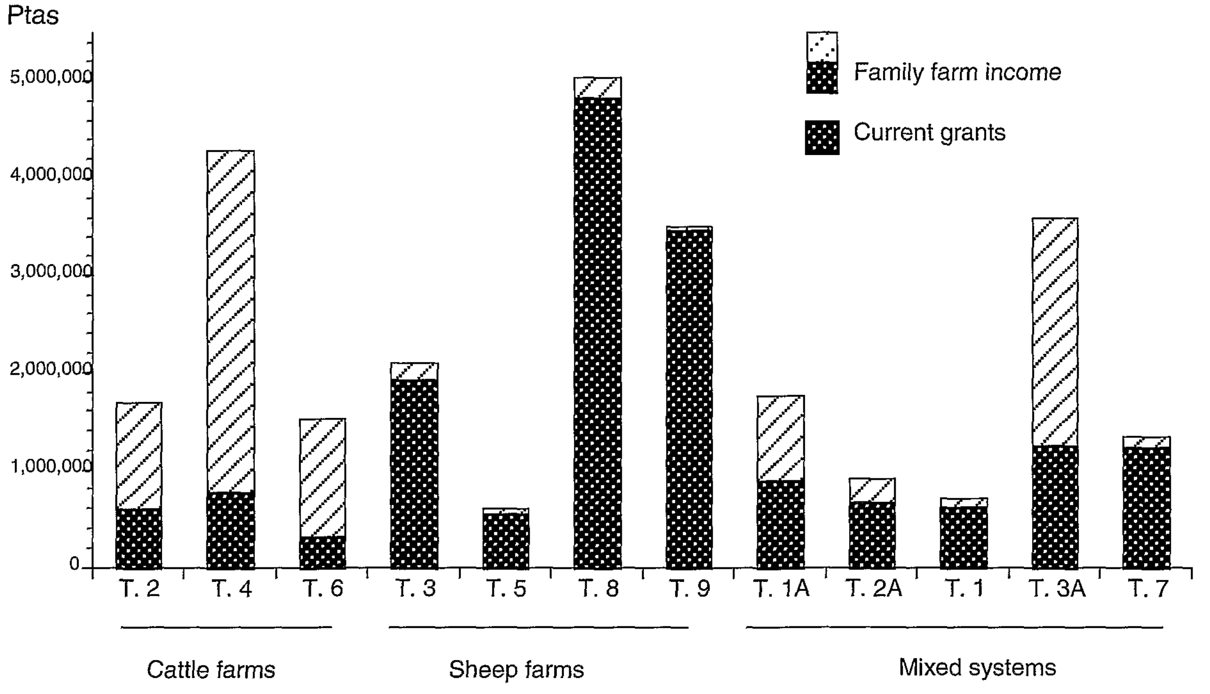

Fig. 3. Importance of current grants on family farm incomes in the groups obtained.

On the one hand, the decreasing meat prices during the last years has led to lower productive incomes for sheep mountain farms with little or no technical progress. On the other hand, the SAP has caused a process of increase in herd size and ageing flocks on these farms (and in the sheep production sector as a whole) (Manrique *et al.*, 1992). In a situation of subsidies based on the number of sheep, the productive performance of sheep is less relevant than larger flock size, and improvements in technical management have less effect on total income.

The importance of the SAP on the total overall subsidy received by farmers confirms that such subsidies do play a important role in compensating for the loss of income in sheep farming. Nevertheless, due to the low level of specific Less Favoured Areas (LFA) subsidies, these subsidies do not fulfil the role of compensation for the particular disadvantages experienced in mountain areas versus lowland areas.

Level of intensification of the farms

The level of economic intensification was considered as the relationship between the available arable land and other factors of production. In our study, the specialised sheep farms were the most intensive, both in terms of labour (the least ha UAA/AWU) and capital (total inputs/ha forage land and total inputs/ha of UAA). The most extensive farms were some of the mixed sheep-cattle farms (Types 7 and 11). Paradoxically, specialised dairy cattle farms were relatively extensive in nature, with stocking rates close to those of mixed sheep-cattle farms, but with land capitalisation slightly higher.

Mountain milk systems can clearly be considered more extensive (less intensification of forage management and less productive performance) than the typically intensive lowland dairy farms (Bazin, 1990). According to Bazin (1990), beef cattle systems demand as much capital per LU as dairy farms, but they achieve a lower and more fluctuating income. One factor that determines farm capital is the level of intensification (total inputs/ha forage land) (Lienard *et al.*, 1988); this would explain the less intensive character of the milk farming systems in mountain areas.

It is necessary to point out that the indicator of land intensification must be considered with caution in the case of transhumant sheep farms because total land used is not accounted for in the farm utilized agricultural area variable (ha UAA).

Specific economic characteristics of cattle farms

Table 4 shows the characteristics of the cattle farms types for the variables used in the analysis. Productive orientation and importance of milk production in the total output are the variables that most differentiated the types. The availability of labour and the number of cows are related. Three types: specialised dairy cattle, one of the beef types (Type 3A) and a mixed sheep-cattle type (Type 2) have similar herd size, UAA and labour availability.

The GM per LU is proportional to the size of the flock in all scenarios. The percentage of variable costs of total costs is generally similar, although is slightly lower in the beef cattle types and much higher in the milk type. Inputs of purchased feed per cow are also lower in the beef cattle types and higher in the dairy type. In the mixed sheep-cattle types, these costs increase with herd size, without this having an apparent effect on the cattle stocking rate per ha of forage land, nor on the percentage of milk sales of total output.

Mixed sheep-cattle types (especially 2A) are the most labour-intensive. Together with the milk type, the beef cattle types have the lowest stocking rate. The highest stocking rates can be observed in some mixed sheep-cattle types. The lowest levels of total inputs/ha arable land and livestock specific costs/TLU are observed in the beef cattle types and in the mixed sheep-cattle type with the lowest herd size. Alternatively, the high levels of these indicators in the dairy types point out their intensive nature.

Beef cattle types, types with large herd size (Type 4) and types with high gross margin (GM/ha UAA, GM/AWU) obtain the highest returns to labour and profitability of the current assets (GM/100 ptas of current assets). Mixed sheep-cattle types with small herds have the lowest productivity. The specialised milk type have the greatest working capital.

Economic productivity of the different types of farms

The economic productivity of the 12 types of farms obtained (FNVA/AWU, FNVA/ha UAA and FNVA) can be seen in Figs 4 and 5. In Type 1 there is a clear relationship between farm net value added and returns to labour (FNVA/AWU). This can be explained by the processes of economic growth, which leads to an increase in FNVA, and which is linked incrementently to labour productivity. At the same time, the types of largest economic size and productivity are the transhumant sheep types (Types 8 and 9) and cattle types (Type 4). These types, together with the mixed sheep-cattle type, have the largest herd size.

The relationships between economic results and size, and between the main factors of production (in this case the farm capital, i.e. livestock) and farm business size are well known. This phenomenon is clear given the impact of current grants on economic results and the proportional relationship with the size of the herd. Most types show low farm business sizes and poor returns to labour.

There is not a proportional relationship between productivity of land (FNVA/ha UAA) and economic activity (FNVA) (Fig. 5). The availability of arable land is not a decisive factor in these systems, since the systems are based on large areas of leased grasslands (summer mountain pastures, transhumance areas). This additional land allowed the use of labour to be maximised and herd sizes to be increased (capital - livestock). In this way, productivity of arable land and total profitability are higher. As a result, the types with additional LU obtain above average FNVA/ha UAA, giving types with highest profits, large herd sizes in relation to the economic potential of the land area (Type 9: transhumant sheep; Type 3A: mixed sheep-cattle). Type 9 is the smallest in terms of arable land. Transhumant Types 3, 8 and 9 use large areas off-farm. The other types have lower economic activity and profit. Less specialised mixed sheep-cattle Types 1 and 2A have small herds and arable land.

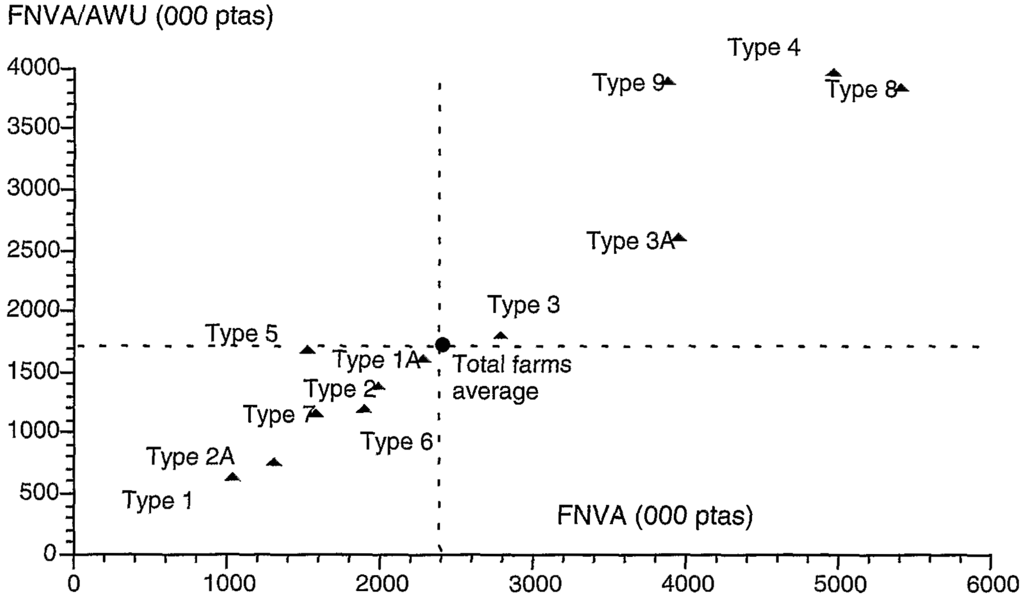

Fig. 4. Level of labour productivity related to economic size in the groups obtained.

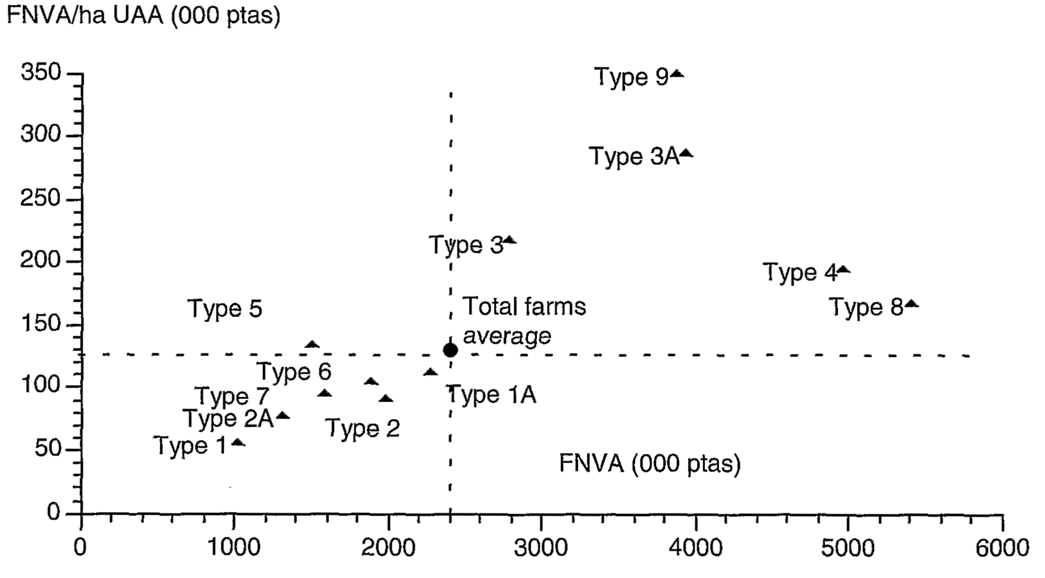

Fig. 5. Level of land productivity related to economic size in the groups obtained.

Types 1, 1A, 2, 2A, 6 and 7, representing 67% of the sample, have both lower average business size and profitability due to sub-optimal herd sizes, and also a lack of specialisation. Low performance levels can also be explained by the lack of intensification of systems. It is well known that an adequate production structure can compensate for low productivity. The mediocre figures of FNVA/ha UAA appear to be linked to the low performance per ha of the farms studied.

These lower performances could be compensated for by adequate structures where economies of scale exist. Also, the poor return to labour seen in many of the types indicates a poor productive system. Nevertheless, we have to consider that in mountain areas, where opportunity costs of land and labour are generally low, a low level of productivity does not necessarily question the future of the farms.

Ways and level of adaptation of the farms

Figure 6 shows the level of adaptation of the farms in two possible ways: structural or via intensification (TLU/AWU and FNVA/ha UAA). The different quadrants represent the level of adaptation of types in relation to the average. Only one of the cattle types with dual-purpose beef-milk production and large herd appears to have high levels of both structural adaptation and intensification (Type 4). In Types 3, 3A, 8 and 9 intensification predominates (16.7% of the farms). These are mixed sheep-cattle types or transhumant sheep types with a large herd size. In Types 2 and 2A (33.4% of farms) the structural adaptation was more important than the intensification process, although these farms have small herds and low availability of labour. In the other types, especially in Types 1, 6 and 7, the processes of both structural adaptation and intensification are not significant.

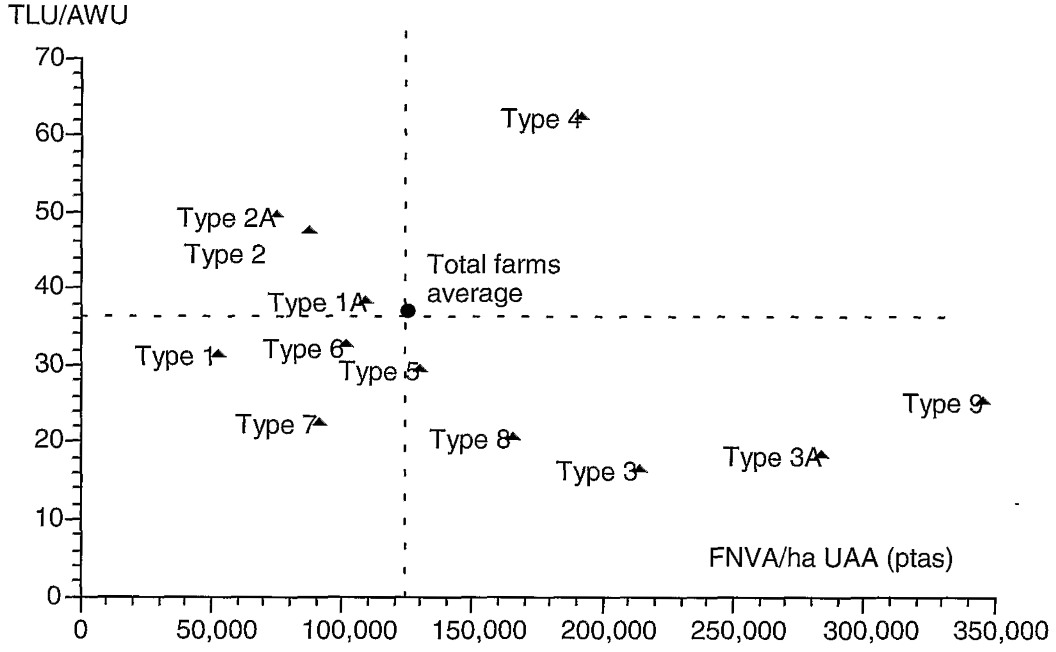

Fig. 6. Level of structural adjustement in the types of farms.

The adaptation process of farming systems in mountain areas, as in other areas in Spain, has been characterised by a rapid rate of reduction in farm numbers. This has allowed some structural adjustment, which is still ongoing. Although the growth in herd size has been an indirect factor of intensification, the difference between income obtained from agriculture versus that from non-agricultural economic sectors has continued. This has encouraged a transfer of resources from the former to the latter in areas where other economic activities produce opportunity costs.

Support measures and structural adjustment of the different systems

Figure 7 shows the size of the herd in TLU and the break-even point, both in the current subsidy situation and in the hypothetical situation of zero subsidy.

In the current situation, all types have bigger herds than that required to break-even. In 8 types the size is 40-60% greater than the break-even point and in 3 types (two of them are transhumant sheep types) the size is 80% greater. Finally, the sheep type with smallest herd size is barely 20% greater than the break-even point.

In the hypothetical situation of no subsidy, the break-even point would be not reached in 2 specialised sheep types (Types 3 and 9) and in small sized mixed sheep-cattle Type 1. Type 5 has greater unitary costs than income, so these farms would not be profitable. The farms with better structural situation, i.e. herd sizes far above the break-even point are those specialised in cattle (Types 2, 4 and 6), transhumant sheep with large herd (Type 8) and mixed sheep-cattle with large number or cattle (Group 3A). The rest of the types are non-specialised and have herd sizes slightly above the break-even point.

In summary, in a hypothetical situation of no-subsidies, 38% of the farms of the sample would have herds below the viable size and 43% would have economically viable herds. Specialised sheep systems, despite their large herds, would have flocks below the break-even point, because these types are more inefficient (high production costs mainly caused by transhumance). The high subsidies received by farmers are vital for their existence. For non-specialised farms (Types 1, 7, 1A and 2A), it can be said that sub-optimal structures of systems of production, particularly small size, are responsible for the negative results.

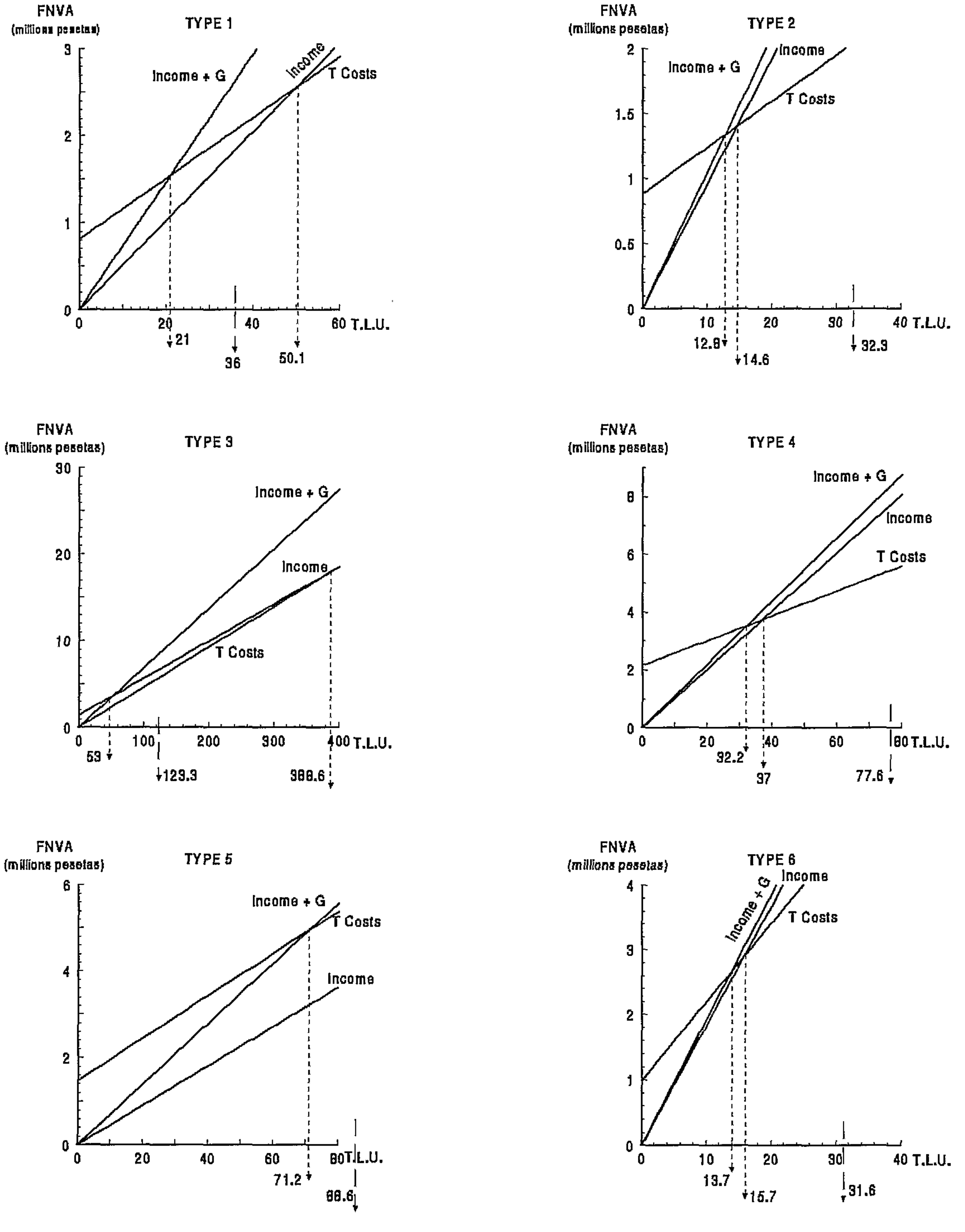

Fig. 7. Break-even point of the types of farms. Income = without grants; income + G = farm income including grants; T. costs = total costs.

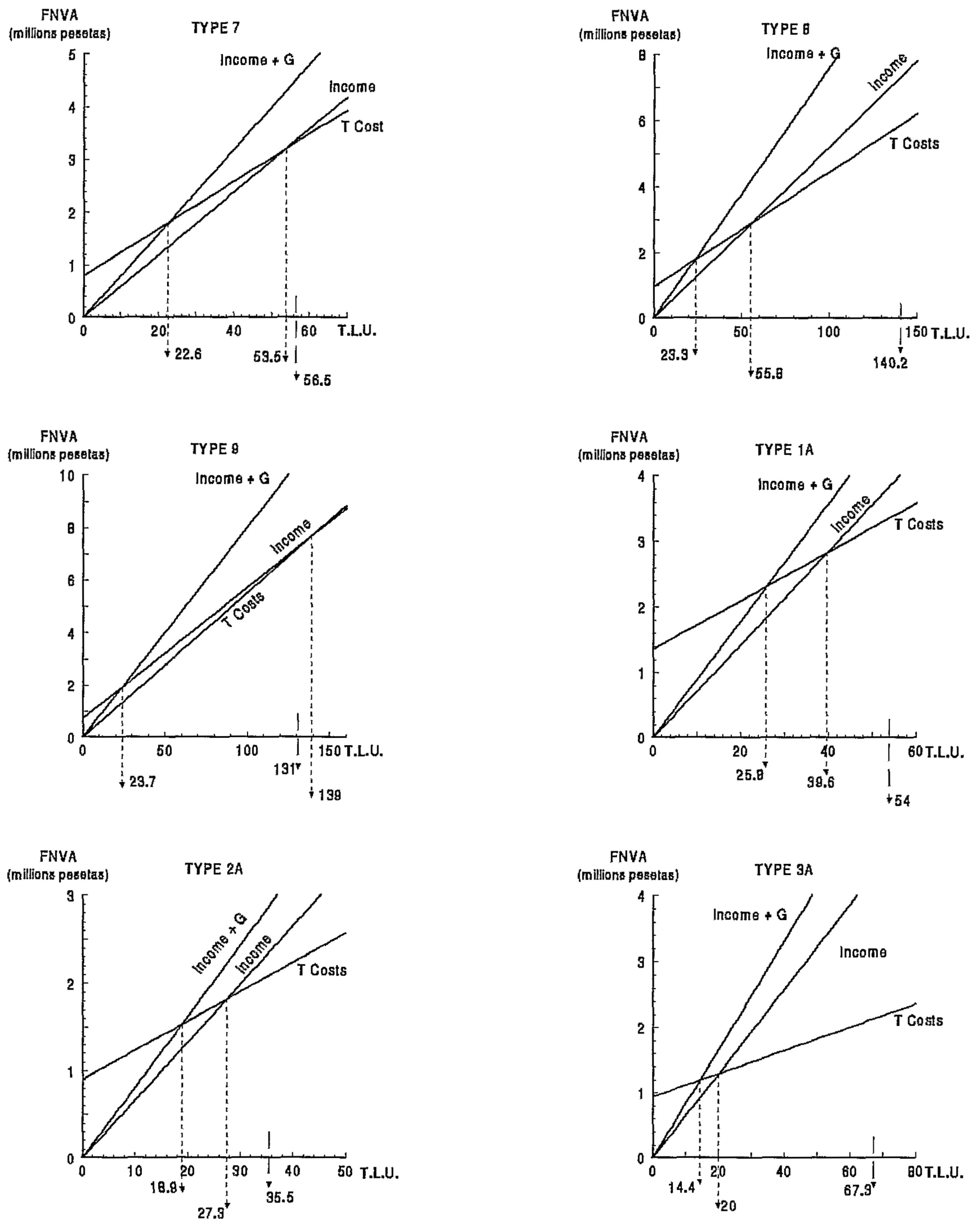

Fig. 7. (cont.) Break-even point of the types of farms. Income = without grants; income + G = farm income including grants; T. costs = total costs.

Conclusions

Transhumant sheep farms, specialised cattle farms and large mixed sheep-cattle farms obtain the best economic results and the greatest return to labour. The large size of these farms and the subsidies received by farmers explain this phenomenon. Large cattle farms obtain the highest productive incomes. Non-transhumant sheep farms, medium or small mixed sheep-cattle farms, and specialised milk systems obtain the worst economic results.

The mixed sheep-cattle types have more extensive systems of production. Milk production systems are also relatively extensive. The transhumant sheep farms obtain the greatest yield per ha of farmland because of the leasing of pastures outside the farm. Nevertheless, these systems are very fragile in economic terms, as they depend on the uncertain future of grant policies, which to a large degree are not specific for these areas.

The on-farm productive orientation and the contribution of milk sales to the total output determine economic differences in cattle farms. GM per LU increases with herd size, which suggests the existence of economies of scale on these farms. Variable costs are, logically, less on beef farms (more extensive) than on dual-purpose and milk farms (more intensive). Therefore, beef farms have larger herds, higher GM per unit, higher returns to labour and return to working capital. On the contrary, milk systems have the lowest return to working capital.

There is a general relationship between the economic size (FNVA) and labour productivity. Only cattle farms and large mixed sheep-cattle farms show high levels of structural adaptation (measured as the herd size per labour available) and intensification processes (measured as an increment of performance per ha of arable land). Although transhumant sheep farms are only 17% of the sample, they represent a means of intensification of farmland use.

Under current subsidy conditions, all types have viable herd sizes that allow them to reach the profitability threshold. Under a no-subsidy scenario, the types with better structural situations are cattle types. The transhumant sheep type and mixed sheep-cattle types with large cattle herds, also have viable structural situations. However, 38% of the sample farms have herds that are not large enough to reach the profitability threshold. These are transhumant sheep farms or mixed sheep-cattle farms predominantly oriented towards sheep production. The results emphasise that compensation policies have stimulated growth of herds and have favoured inefficient systems, which show little evidence of structural adaptation. But they have helped to maintain a population and, perhaps a better landscape conservation.

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