DOMESTIC ANIMAL BIODIVERSITY CONSERVATION IN THE EUROPEAN UNION

Giovanni Signorello[1], Gioacchino Pappalardo and Giuseppe Cucuzza

University of Catania, Dipartimento di Scienze Economico-Agrarie ed Estimative (DISEAE), via Santa Sofia 98, 95123 Catania, Italy

Abstract

The content of farm animal biodiversity conservation measures currently under implementation in the European Union (EU), as a result of the application of EC Regulations 1257/99 and 445/2002 is examined by a surveyed of 69 Rural Development Plans (RDPs) set up in EU Member States. The analysis focuses on six livestock mammalian species (asses, cattle, goats, horses, pigs, and sheep). The analysis highlights that many breeds at risk of extinction according the FAO are not included in the RDPs and also indicates that the main efforts of the RDPs are devoted to preserving local cattle and sheep breeds. As concerns the financial aspects of livestock biodiversity measures, we note that the payments offered to farmers do not take into account the different probabilities of extinction associated with each breed in each country. Furthermore, we observe that payments do not meet all of the relevant criteria stated in the EEC Regulations. In many cases, we observe that, in spite of the Union's support to farmers, it still remains unprofitable to rear local breeds. These anomalies suggest the need for a revision of the current EU supporting measures related to the conservation of livestock biodiversity. Finally, by using FAO indicators on the current population size of each breed, we estimate the level of expected public expenditure necessary to ensure the upgrading of breeds from their "at-risk" status to a "not-at-risk" status during the period 2000-2006.

Key Words: Domestic Animal Biodiversity, European Union Rural Development Plans.
JEL Codes: Q18, Q20

[1] Corresponding author, E-Mail address: g.signorello@unict.it

1. Introduction

According to the most recent estimates of FAO (1999, 2000 a,b), 10% of domesticated breeds have been lost in the last century, and a further 20% are at risk of extinction. The threat to farm animal biodiversity is dramatically displayed in Figure 1, which shows a summary of the status of the world's farm animal breeds. In Europe 18% of breeds existing in the early 1900's have already been lost, and 40% of recorded breeds risk becoming extinct over the next 20 years, unless significant changes take place in the driving forces behind biodiversity depletion.

Insert Figure 1 near here

The causes of biodiversity depletion are widely known, as well as the ecological and socio-economic consequences of farm animal biodiversity loss (Alderson, 1990; OECD, 1996; Pearce and Moran, 1994)[2]. The challenge facing biodiversity conservation is the need for the development of strategies, actions, and institutions that can slow the rate of genetic erosion by encouraging, especially at the farm level, the effective conservation and sustainable use of farm animal genetic resources (Hawksworth *et al*., 1997; Lefort *et al*., 1999; Ollivier *et al*., 1994; Peel and Tribe, 1983; Simon, 1984; Woolliams *et al*., 1999). The European Union (EU) seeks to pursue the Convention on Biological

[2] The most important force behind the loss of farm breeds is the homogenisation of livestock production. Farmers replace local breeds in favour of a few high-yielding breeds. This specialisation is supported by perverse economic incentives and the fact that economically rational farmers' decisions only account for private profitability. Drucker *et al*. (2001) report that In European Union, over 60% of cattle are derived from the Holstein Friesian breed.

Diversity (CBD) and The Third Conference of the Parties (COP3) recommendations under the auspices of “Agenda 2000” and Regulations 1257/99 and 445/2002 on support to Rural Development Plans (RDPs). These EU regulations make provisions and set general guidelines and goals under which member countries can implement voluntary management agreements for the provision of livestock biodiversity services. The specific measure provides for payments to farmers, in the form of cost sharing or incentive payments, in return for maintaining local, traditional and rustic breeds at risk of extinction (EC, 1997; EC, 1998; EC, 2001).

The objective of this paper is to identify response indicators pertinent to livestock biodiversity, ascertain whether compensation levels are sufficient to encourage the farming of local breeds and determine the costs of effectively protecting breeds at risk. To pursue this objective, we surveyed 69 Rural Development Plans (RDPs) set up in EU Member States. The analysis focuses on six livestock mammalian species: asses, cattle, goats, horses, pigs, and sheep The starting point for our investigation was the Domestic Animals Diversity-Information System (DAD-IS) FAO database which monitors the status of breeds in the world. By comparing the breeds included in the DAD-IS FAO database with breeds entered in the various RDPs, we are able to identify the conservation priorities of each country. By this examine it is possible valuing net production costs and EU compensation payment levels it was possible to determine whether the latter are sufficient to make farming with local breeds profitable. The total costs of ensuring that breeds currently "at risk" reach a population size sufficient to be considered "not at risk" could also be calculated.

2. State indicators on endangered Livestock breeds in the European Union

State indicators on endangered breeds are available from many sources. At present, the most widely reported state indicator pertinent to livestock biodiversity is the list provided by FAO (1993, 1995, 1999, 2000) through the "Domestic Animals Diversity - Information System" (DAD-IS)[3].

DAD-IS monitors breeds worldwide and classifies them into seven risk categories: extinct, critical, endangered, critical-maintained, endangered-maintained, not at risk, and unknown[4]. The main domesticated animals included in this program are six mammalian species (asses, cattle, goats, horse, pigs and sheep) and four avian species (chickens, ducks, geese and turkeys).

In the following analysis we take into account only breeds included in the critical, endangered, critical-maintained and endangered-maintained categories, and breeds included in the not-at-risk category but with a population showing a decreasing trend.

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[3] EU rules state that breeds to be protected must be extracted from lists compiled by authoritative international institutions (such as the FAO) or from specific surveys conducted by each country (i.e. "Action plan for the preservation and sustainable use of biodiversity in the livestock sector").

[4] "Extinct" indicates that it is no longer possible to recreate the breed population. Extinction is absolute when there are no breeding males (semen), breeding females (oocytes), nor embryos remaining. "Critical" indicates that the total number of breeding females is less than 100, or the total number of breeding males is less than or equal to five, or the overall population size is close to, but slightly above 100 and decreasing, and the percentage of pure-bred females is below 80 percent. "Endangered" indicates that: the total number of breeding females is between 100 and 1000; or the total number of breeding males is less than or equal to 20 and greater than five; or the overall population size is close to, but slightly above, 100 and increasing and the percentage of pure-bred females is above 80 percent; or the overall population size is close to, but slightly above 1000 and decreasing, and the percentage of pure-bred females is below 80 percent. "Critical-maintained" and "endangered-maintained" indicate that breeds are being maintained by an active public conservation programme or within a commercial or research facility. "Not at risk" indicates breeds for which the total number of breeding females and males is greater than 1000 and 20 respectively; or the population size approaches 1000 and the

In the Appendix, Table A shows breeds classified by risk of extinction according the DAD-IS FAO database. Table A also shows those local breeds included in the RDPs[5].

3. Response indicators

Table 1 covers the breeds listed in both datasets and shows the level of livestock biodiversity protection in the RDPs relative to FAO list. We consider this percentage as a response indicator.

Insert Table 1 near here

In the EU, the total number of local breeds at risk is 773; 172 breeds fall into the "Critical" category, 302 breeds are included in the "Endangered" category, 39 breeds are in the "Critical-maintained" category, and 105 breeds are classified as "Endangered-maintained". It is worth noting that in the EU there are currently also at least 155 local breeds not at risk of extinction but with a decreasing trend in population size. In terms of species, the highest numbers of breeds at risk belong to sheep (223), horses (200), and cattle (190). At an intermediate level, are pigs (79) and goats (69) and the lowest number of local

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percentage of pure-bred females is close to 100 percent, and the overall population size is increasing. Finally, "unknown" covers breeds for which no data are available.

[5] A detailed database is available upon request from the authors. According by EEC Reg. 445/02, the thresholds under which a local breed is considered as being in danger of being lost to farming, are (number of breeding females): Cattle 7.500, Sheep 10.000, Goats 10.000, Equidae 5.000, Pigs 15.000. The number is calculated, for all EU Member States, for females of the same breed available for purebred reproduction, included in a register recognised by the Member State (e.g. herd book or flock book).

breeds at risk belongs to ass (12). As concerns the geographical distribution of biodiversity livestock, the EU country with the highest number of local breeds at risk is Germany (164), followed by France (123) and Italy (115).

The comparison between the two datasets highlights that, in every country, the number of local breeds included in the RDPs is consistently lower than the number of analogue breeds indicated by FAO. In total, only 310 out of the 773 breeds (equivalent to 40.1%) are included in the RDPs. The biggest level of livestock biodiversity protection is pursued in Austria (87.9%) and in Spain (80.4%). Belgium (68.4%), Greece (64.5%), Italy (64.4%), France (43.9%) occupy intermediate positions. The lower levels of protection are found in Finland (35.3%), Sweden (30.0%), Germany (28.1%), Luxembourg (25.0%), Portugal (25.0%) and Ireland (13.0%). Denmark, The Netherlands and the United Kingdom have not included any farm animal protection measures in their RDPs[6]. With regard to levels of protection for each mammalian species, the ranking is as follows: ass (91.7%), cattle (48.9%), sheep (44.8%), goats (42%),horses (30%) and pigs (21.5%).

4. Payment Levels

Table 2 reports the annual payments[7] made to farmers who, on a voluntary and contractual basis, raise local breeds at risk of extinction for a 5 year period[8]. Payments are expressed in Euro (€) per Livestock Unit[9].

[6] In the United Kingdom, since the recent outbreak of Foot and Mouth Disease and the risk presented to a number of Rare and Traditional breeds, public awareness of the problem has increased. There have also been demands for the National Co-ordinator for Farm Animal Genetic Resources (FanGR) to become more active in co-ordinating conservation and developing a National Action Plan following on from the FAO SoW Report process.

[7] A detailed list of the payments for each breed included in the RDPs is available upon request from the authors.

Insert Table 2 near here

On average, the highest payment is made for farming horses (147,25 €/LU), whilethe lowest payment is made for farming sheep (98,06 €/LU). Detailed analysis of the full database reveals that the payments in every RDP, generally, disregard the risk status of breeds within the species. The general absence of consideration of the probability of extinction in the calculation of the payments raises doubts about the degree to which the established criteria for establishing the monetary level of the payments is satisfied. This is because although EC Regulations 1257/99 and 445/2002 state that State Member and sub-member level administrative units are free to determine the payments[10]. The payment must be calculated on the basis of: i) income foregone; ii) additional costs resulting from the commitment; iii) the need to provide an incentive[11]; and iv) the cost of any non-remunerative capital works necessary for the fulfilment of the commitment . To test the validity of our doubts regarding the degree to which the criteria are satisfied, we examined each of RDPs in order to determine the

[8] To be eligible for voluntary agreement, breeders must be members of a recognized breeders association. Furthermore, the number of livestock at risk of extinction must not be reduced during the overall period of the contract.

[9] Maximum annual amounts eligible for European aid is 450 EURO/ha. This payment, which is an area-based system, is converted to a Livestock Unit according to the converter rules reported in Annex VII of the EC Regulation 2092/1991. EC Regulation 2328/91, Annex 1, states that cattle over two years and equines over six months of age are equivalent to 1.0 of a Livestock Unit (LU); cattle between six months and two years of age are 0.6 LU; sheep and goat are 0.15 LU; pigs are 0.30 LU.

[10] These criteria are stated in Art. 24 of EEC Reg. 1257/99.

[11] Art 19 of the EEC Reg. 445/02 lays down that “The incentive may not exceed 20% of the income forgone and additional costs due to commitment given, except in the case of specific commitments where a higher rate in deemed to be indispensable for the effective implementation of the measure”.

economic basis upon which payment levels are calculated. This analysis revealed that only a few RDPs offer a detailed explanation regarding the way in which the level of payment is determined. The only justification we found is the use of a comparison, in terms of economic performance, between a local breed versus a higher yielding breed. This comparison is, however, limited only to representative breeds per species, and figures are then extrapolated, without any adjustment, to breeds of other species. Table 3 displays, as a pertinent example, the economic accounts included in the RDP of Sicily (Regione Siciliana, 2001). Economic figures reveal that: the payment is irrespective of species; farming local breeds involves considerable losses in spite of payments to farmers; there is no reference to any other criteria, such as the need to provide incentives; and finally, that the payment does not allow the maximum stocking rate per hectare to be reached It is clear that such payments do not offer adequate support either to maintain the current population of at risk breeds or to induce farmers to switch from higher yielding breeds to local breeds. The absence of profitability, which we also found in every RDP, raises serious concerns about the eventual success of the livestock biodiversity programs.

Insert Table 3 near here

5. Amount of Conservation Costs

In order to assess the total cost of the livestock biodiversity conservation program of the RDPs, we estimated:

1. the public expenditure necessary to ensure the maintenance of the current population size of breeds at risk. In the appraisal, we take into account either breeds whose current population size is lower than the threshold level indicated by FAO (1000 head and 20 breeding females and males respectively), or breeds not-at-risk but with a decreasing trend in the population size. Values are obtained by multiplying the current population size of each breed, as listed in the FAO DAD-IS, by the specific annual payment.
2. the public expenditure necessary to ensure the upgrade of breeds from their at-risk status to a not-at-risk status. This expenditure only refers to breeds whose current population size is lower than the threshold level indicated by FAO. Values are estimated by multiplying the specific annual payment by 1022[12].

In the previous section we established that payment levels generally are insufficient to make local breeds profitable. Thus, the following estimates, which undervalue clearly effective total conservation costs, point out only the financial resources which RDPs require to support current livestock biodiversity measures.

Table 4 reports these partial and total estimates by species and country. Values are obviously based on the assumption that farmers participate in the present conservation program. An analysis of the estimates reveals that the costs differ

by country and species. France, Italy and Finland are the Member States which would need to support the highest maintenance expenditures. Italy, Germany and Spain are the countries which would bear the highest costs in reaching the "not at risk" threshold level for local breeds. Germany, Sweden and Luxembourg exhibit a maintenance expenditure lower than the expenditure to move breeds to a "not at risk" status, which means that in these countries the current population of local breeds is very low. Italy, France and Spain are the countries that should require the highest budgets. In the EU, almost € 40 million are necessary to ensure that all (310) local breeds included in the RDPs will no longer be at risk of extinction. The main part of this expected cost is devoted to cattle and horse species. Ass and pig are the species which exhibit a maintenance expenditure lower than the expenditure required to reach the safety level.

6. Conclusions

The analysis reveals that: the number of breeds included in the RDP's are consistently lower than the number of breeds listed by the FAO; payments to farmers generally do not take into account the different breed extinction probabilities; and payments do not offer adequate incentives either to maintain the current population of at risk breeds nor to induce farmers to switch from higher yielding breeds to local breeds.

Overall this would seem to indicate the absence of a general strategy for decision-making. It raises serious concerns about the effective achievements of

[12] This number corresponds to the threshold level required by DAD-IS FAO to consider a breed

goals, and calls for a revision of the current EU design and implementation of agri-environmental measures related to the conservation of livestock biodiversity. The revision process should look at several issues. First of all, in the context of limited budgets, it should identify useful operative criteria for setting conservation priorities and differentiating economic support based on those priorities (FAO, 2001). In this regard, a possible solution may be the "expected overall utility" criterion suggested by Simianer *et al*. (this issue), which combines ecological and economic factors. Furthermore, there should be an attempt to increase the profitability of local breed farming (Ollivier, 1996). This adjustment, which would favour participation in the program, could be achieved in several ways. The most obvious and immediate way would be to make higher payments. However, this increment, which would require different maximum eligible amounts per Livestock Unit, should take into account the area stocking limit, so as to be consistent with other environmental conservation goals (e.g. soil conservation). Another route would be to implement common agricultural policies consistent with the above goals. For instance, it would be appropriate to have policies which provide support for agricultural products or foodstuffs which have an identifiable relationship with local breeds.

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not at risk.

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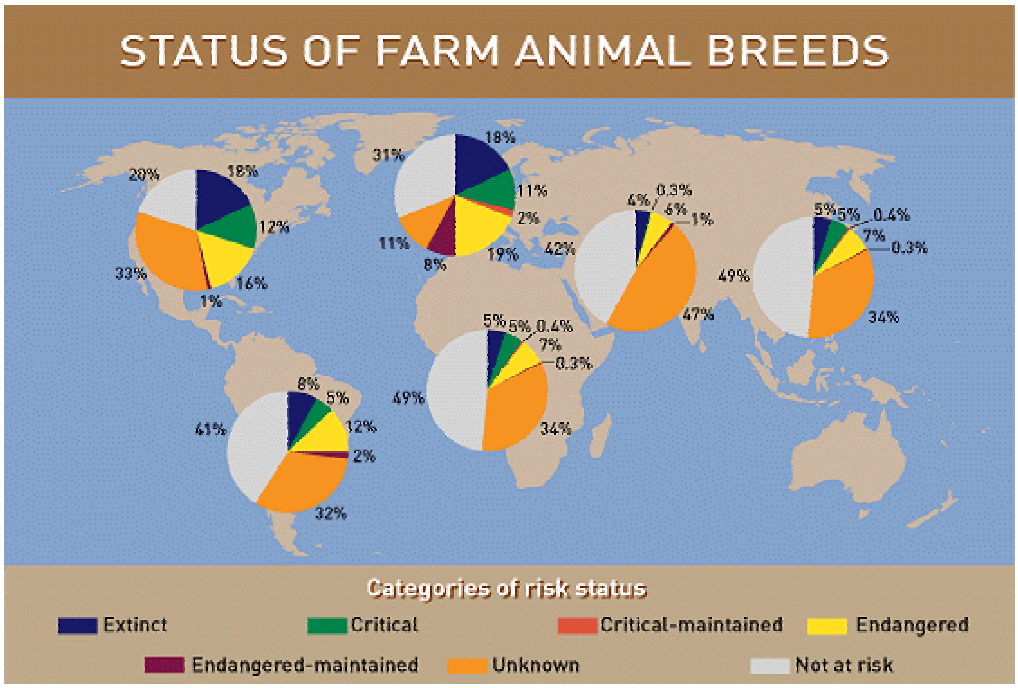
Figure 1. Status of farm animal breeds in the World



Source: FAO web site (2000)

Table 1. Levels of Conservation in the Rural Development Plans

Member State	ASS			CATTLE			GOAT			HORSE			PIG			SHEEP			TOTAL		
	FAO	RDP	%	FAO	RDP	%	FAO	RDP	%	FAO	RDP	%	FAO	RDP	%	FAO	RDP	%	**FAO**	**RDP**	**%**
AUSTRIA	-	-	-	11	8	72.73	4	4	100.00	7	6	85.71	2	2	100.00	9	9	100.00	**33**	**29**	**87.88**
BELGIUM	-	-	-	3	1	33.33	4	3	75.00	2	0	0.00	-	-	-	10	9	90.00	**19**	**13**	**68.42**
DENMARK	-	N.E.	N.E.	5	N.E.	N.E.	4	N.E.	N.E.	9	N.E.	N.E.	3	N.E.	N.E.	9	N.E.	N.E.	**30**	**N.E.**	**N.E.**
FINLAND	-	-	-	4	3	75.00	1	1	100.00	10	0	0.00	-	-	-	2	2	100.00	**17**	**6**	**35.29**
FRANCE	1	0	0.00	31	16	51.61	5	3	60.00	28	14	50.00	24	0	0.00	34	21	61.76	**123**	**54**	**43.90**
GERMANY	-	-	-	36	12	33.33	13	3	23.08	73	13	17.81	11	5	45.45	31	13	41.94	**164**	**46**	**28.05**
GREECE	-	-	-	5	2	40.00	1	1	100.00	6	5	83.33	-	-	-	19	12	63.16	**31**	**20**	**64.52**
IRELAND	-	-	-	5	2	40.00	1	0	0.00	6	1	16.67	2	0	0.00	9	0	0.00	**23**	**3**	**13.04**
ITALY	6	6	100.00	23	18	78.26	26	11	42.31	17	14	82.35	9	4	44.44	34	24	70.59	**115**	**77**	**66.96**
LUXEMBOURG	-	-	-	-	-	-	-	-	-	3	1	33.33	1	0	0.00	-	-	-	**4**	**1**	**25.00**
NETHERLANDS	-	N.E.	N.E.	6	N.E.	N.E.	-	N.E.	N.E.	2	N.E.	N.E.	2	N.E.	N.E.	6	N.E.	N.E.	**16**	**N.E.**	**N.E.**
PORTUGAL	-	-	-	3	2	66.67	3	0	0.00	2	1	50.00	1	1	100.00	7	0	0.00	**16**	**4**	**25.00**
SPAIN	5	5	100.00	24	23	95.83	1	1	100.00	5	5	100.00	10	4	40.00	11	7	63.64	**56**	**45**	**80.36**
SWEDEN	-	-	-	10	6	60.00	2	2	100.00	14	0	0.00	3	1	33.33	11	3	27.27	**40**	**12**	**30.00**
UNITED KINGDOM	-	N.E.	N.E.	24	N.E.	N.E.	4	N.E.	N.E.	16	N.E.	N.E.	11	N.E.	N.E.	31	N.E.	N.E.	**86**	**N.E.**	**N.E.**
TOTAL	**12**	**11**	**91.67**	**190**	**93**	**48.95**	**69**	**29**	**42.03**	**200**	**60**	**30.00**	**79**	**17**	**21.52**	**223**	**100**	**44.84**	**773**	**310**	**40.10**

Source: FAO (DAD-IS Program), National RDPs
Note: N.E. = Not Existing

Table 2. Annual Payments to Farmers (€)

MEMBER STATE	ASS		CATTLE		GOAT		HORSE		PIG		SHEEP	
	Mean	Dev. St.	Mean	Dev. St.	Mean	Dev. St.	Mean	Dev. St.	Mean	Dev. St.	Mean	Dev. St.
AUSTRIA			145,34	-	21,80	-	145,34	-	43,60	-	21,80	-
BELGIUM			100,00	-	12,50	-					12,50	-
FINLAND			168,19	-	168,19	-					168,19	-
FRANCE			122,00	-	122,00	-	130,86	33,14			122,00	-
GERMANY			139,25	124,16	100,00	81,02	150,23	110,25	238,40	249,23	66,15	51,93
GREECE			115,98	-	115,98	-	115,98	-			112,64	12.00
IRELAND [a]			200,00	-			200,00	-				
ITALY	138,93	32,10	201,67	85,05	191,18	78,40	173,63	49,80	152,75	56,01	149,04	96,43
LUXEMBOURG							150,00	-				
PORTUGAL			139,00	-			139,00	-	139,00	-		
SPAIN	120,20	-	120,20	-	120,20	-	120,20	-	120,20	-	120,20	-
SWEDEN			110,00	-	110,00	-			165,00	-	110,00	-

Note: [a] This amount is paid for females only and payment is made only once in the lifetime of the animal. Therefore, a payment of €400 per LU is paid on average every second year.

Table 3. Costs and benefits of livestock farming: Comparison between "high yielding" breeds and local breeds at risk of extinction (€)

	CATTLE		SHEEP		GOAT		HORSE		PIG	
	Bruna	*Modicana and Cinisara*	Comisana	*Barbaresca*	Maltese	*Girgentana*	Aveglinese	*Ragusana*	Landrace	*Nera Siciliana*
Income per head	1.985,78	1.319,03	186,96	145,90	172,50	130,92	578,43	309,87	1.473,45	791,21
Cost per head	1.679,00	1.371,71	157,52	157,52	157,52	157,52	377,53	367,20	1.249,16	973,98
(Income – Cost) per head	306,26	- 52,68	29,44	- 11,62	14,98	- 26,60	200,90	- 57,58	224,29	- 182,46
Income per head		- 359,00		- 41,06		- 41,57		- 258,48		- 406.75
Income per LU before compensation*		- 359,00		- 273,46		- 276,86		- 258,48		- 1.354,48
Compensation per LU		200,00		200,00		200,00		200,00		200,00
Income per LU after compensation		**- 159,00**		**- 73,46**		**- 76,86**		**- 58,48**		**- 1.154,48**

Source: Rural Development Programme of Sicily (Italy).
Note: According to EU Regulation 2328/91, Annex 1, cattle over two years and equines over six months of age are equivalent to 1.0 Livestock Units (LU); cattle from six months to two years of age, 0.6 LU; sheep and goat: 0.15 LU; Pigs, 0.30 LU.
Local breeds are indicated in italics.

Table 4. Public expenditure for biodiversity conservation (*values in Euro*)

Member State	Species	Expenditure to ensure the maintenance of current population size (A)	Expenditure to ensure the moving of breed to a not at risk status (B)	Total expenditure (A + B)
AUSTRIA	Ass	-	-	-
	Cattle	943.837,96	514.212,92	1.458.050,88
	Goat	5.192,76	8.175,00	13.367,76
	Horse	934.826,88	367.274,18	1.302.101,06
	Pig	13.080,00	13.655,52	26.735,52
	Sheep	28.426,11	13.030,95	41.457,06
	Total	**1.925.363,71**	**916.348,57**	**2.841.712,28**
BELGIUM	Ass	-	-	-
	Cattle	100.000,00	2.200,00	102.200,00
	Goat	5.338,13	410,62	5.748,75
	Horse	-	-	-
	Pig	-	-	-
	Sheep	5.163,75	12.082,50	17.246,25
	Total	**110.501,88**	**14.693,13**	**125.195,00**
FINLAND	Ass	-	-	-
	Cattle	1.208.445,15	312.665,21	1.521.110,36
	Goat	102.276,34	-	102.276,34
	Horse	-	-	-
	Pig	-	-	-
	Sheep	1.683.901,46	6.963,07	1.690.864,53
	Total	**2.994.622,95**	**319.628,28**	**3.314.251,23**
FRANCE	Ass	-	-	-
	Cattle	2.172.332,00	1.133.258,00	3.305.590,00
	Goat	44.103,00	13.944,60	58.047,60
	Horse	3.483.592,00	751.364,00	4.234.956,00
	Pig	-	-	-
	Sheep	982.636,80	81.270,30	1.063.907,10
	Total	**6.682.663,80**	**1.979.836,90**	**8.662.500,70**
GERMANY	Ass	-	-	-
	Cattle	600.988,00	1.249.814,00	1.850.802,00
	Goat	7.600,50	38.389,50	45.990,00
	Horse	566.390,00	1.560.496,00	2.126.886,00
	Pig	90.742,50	274.724,70	365.467,20
	Sheep	234.960,00	17.447,25	252.407,25
	Total	**1.500.681,00**	**3.140.871,45**	**4.641.552,45**
GREECE	Ass	-	-	-
	Cattle	176.521,56	60.541,56	237.063,12
	Goat	17.779,73		17.779,73
	Horse	471.574,68	121.083,12	592.657,80
	Pig	-	-	-
	Sheep	179.965,78	27.243,70	207.209,48
	Total	**845.841,75**	**208.868,38**	**1.054.710,13**
IRELAND	Ass	-	-	-
	Cattle	622.400,00	196.800,00	819.200,00
	Goat	-	-	-
	Horse	318.000,00	90.800,00	408.800,00
	Pig	-	-	-
	Sheep	-	-	-
	Total	**940.400,00**	**287.600.00**	**1.228.000,00**
ITALY	Ass	122.646,80	729.292,40	851.939,20
	Cattle	3.561.995,00	2.051.885,00	5.613.880,00
	Goat	568.269,45	109.440,45	677.709,90
	Horse	1.687.189,20	1.407.408,40	3.094.597,60
	Pig	72.059,40	115.273,20	187.332,60
	Sheep	659.256,90	254.433,90	913.690,80
	Total	**6.671.416,75**	**4.667.733,35**	**11.339.150,10**
LUXEMBOURG	Ass	-	-	-
	Cattle	-	-	-
	Goat	-	-	-
	Horse	54.750,00	98.550,00	153.300,00
	Pig	-	-	-
	Sheep	-	-	-
	Total	**54.750,00**	**98.550,00**	**153.300,00**
PORTUGAL	Ass	-	-	-
	Cattle	278.000,00	6.116,00	284.116,00
	Goat	-	-	-
	Horse	9.730,00	132.328,00	142.058,00
	Pig	8.340,00	34.277,40	42.617,40
	Sheep	-	-	-
	Total	**296.070,00**	**172.721,40**	**468.791,40**

Table 4. - *continued*

Member State	Species	Expenditure to assure the maintenance of current population size (A)	Expenditure to assure the moving of breed to at not risk status (B)	Total expenditure (A + B)
SPAIN	Ass	349.181,00	265.041,00	614.222,00
	Cattle	2.059.026,00	1.586.159,20	3.645.185,20
	Goat	9.015,00	9.411,66	18.426,66
	Horse	250.617,00	363.605,00	614.222,00
	Pig	45.904,38	101.508,90	147.413,28
	Sheep	73.886,94	55.099,68	128.986,62
	Total	**2.787.630,32**	**2.380.825.44**	**5.168.455,76**
SWEDEN	Ass	-	-	-
	Cattle	246.400,00	428.120,00	674.520,00
	Goat	9.240,00	24.486,00	33.726,00
	Horse	-	-	-
	Pig	24.750,00	25.839,00	50.589,00
	Sheep	35.475,00	19.701,00	55.176,00
	Total	**315.865,00**	**498.146,00**	**814.011,00**
TOTAL	**Ass**	**471.827,80**	**994.333,40**	**1.466.161,20**
	Cattle	**11.969.945,67**	**7.541.771,89**	**19.511.717,56**
	Goat	**759.799,91**	**194.846,18**	**954.646,08**
	Horse	**7.776.669,76**	**4.892.908,70**	**12.669.578,46**
	Pig	**254.876,28**	**565.279,72**	**820.155,00**
	Sheep	**3.883.672,74**	**487.272,35**	**4.370.945,09**
	Total	**25.116.792,16**	**14.676.411,23**	**39.793.203,39**

Appendix. Table A. Local breeds at risk of extinction in the European Union. Comparison between DAD-IS FAO and RDPs

MEMBER STATE		ASS						CATTLE						GOAT						HORSE						PIG						SHEEP						**TOTAL**					
		STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						**STATUS RISK**					
		C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	**C**	**E**	**CM**	**EM**	**NR**	**NRD**
AUSTRIA	Breeds at risk	0	0	0	0	0	0	1	0	3	4	2	1	0	0	0	4	0	0	0	1	2	2	1	1	0	2	0	0	0	0	0	3	3	1	2	0	**1**	**6**	**8**	**11**	**5**	**2**
	Breeds included in RDP	0	0	0	0	0	0	1	0	1	4	2	0	0	0	0	4	0	0	0	1	2	2	1	0	0	2	0	0	0	0	0	3	3	1	2	0	**1**	**6**	**6**	**11**	**5**	**0**
BELGIUM	Breeds at risk	0	0	0	0	0	0	0	1	0	0	0	2	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	7	0	0	0	0	**3**	**14**	**0**	**0**	**0**	**2**
	Breeds included in RDP	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6	0	0	0	0	**3**	**10**	**0**	**0**	**0**	**0**
DENMARK	Breeds at risk	0	0	0	0	0	0	0	2	1	2	0	0	0	2	2	0	0	0	0	7	0	2	0	0	0	1	2	0	0	0	0	8	0	1	0	0	**0**	**20**	**5**	**5**	**0**	**0**
	Breeds included in RDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
FINLAND	Breeds at risk	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	1	0	7	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	**7**	**3**	**2**	**0**	**3**	**2**
	Breeds included in RDP	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	**0**	**1**	**2**	**0**	**3**	**0**
FRANCE	Breeds at risk	1	0	0	0	0	0	5	5	3	10	4	4	0	2	0	1	1	1	2	17	0	2	4	3	4	14	2	4	0	0	1	4	0	5	15	9	**13**	**42**	**5**	**22**	**24**	**17**
	Breeds included in RDP	0	0	0	0	0	0	0	2	3	7	4	0	0	1	0	1	1	0	0	8	0	2	4	0	0	0	0	0	0	0	1	2	0	3	15	0	**1**	**1**	**3**	**13**	**24**	**0**
GERMANY	Breeds at risk	0	0	0	0	0	0	17	18	0	0	1	0	8	5	0	0	0	0	54	18	0	0	1	0	6	5	0	0	0	0	11	13	0	0	7	0	**96**	**59**	**0**	**0**	**0**	**0**
	Breeds included in RDP	0	0	0	0	0	0	3	8	0	0	1	0	2	1	0	0	0	0	6	6	0	0	1	0	2	3	0	0	0	0	0	6	0	0	7	0	**13**	**24**	**0**	**0**	**9**	**0**
GREECE	Breeds at risk	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	7	0	0	9	3	**0**	**14**	**0**	**0**	**14**	**3**
	Breeds included in RDP	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	2	0	0	3	0	0	0	0	0	0	0	0	3	0	0	9	0	**0**	**6**	**0**	**0**	**14**	**0**
IRELAND	Breeds at risk	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	1	2	2	0	1	0	1	1	1	0	0	0	0	0	8	0	0	0	1	**3**	**15**	**0**	**2**	**0**	**3**
	Breeds included in RDP	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**1**	**0**	**2**	**0**	**0**
ITALY	Breeds at risk	3	3	0	0	0	0	2	1	3	8	6	3	6	16	0	0	3	1	4	9	0	0	4	0	3	4	0	1	0	1	7	15	0	5	7	0	**25**	**48**	**3**	**14**	**20**	**5**
	Breeds included in RDP	3	3	0	0	0	0	1	1	3	7	6	0	2	6	0	0	3	0	3	7	0	0	4	0	2	2	0	0	0	0	4	9	0	4	7	0	**15**	**28**	**3**	**11**	**20**	**0**

Appendix. Table A - *continued*

MEMBER STATE		ASS						CATTLE						GOAT						HORSE						PIG						SHEEP						**TOTAL**					
		STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						STATUS RISK						**STATUS RISK**					
		C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	C	E	CM	EM	NR	NRD	**C**	**E**	**CM**	**EM**	**NR**	**NRD**
LUXEMBOURG	Breeds at risk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**0**	**2**	**0**	**1**	**0**	**1**
	Breeds included in RDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**1**	**0**	**0**
NETHER-LANDS	Breeds at risk	0	0	0	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	1	0	4	1	0	**1**	**2**	**2**	**7**	**4**	**0**
	Breeds included in RDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
PORTUGAL	Breeds at risk	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	7	**2**	**2**	**1**	**1**	**0**	**10**
	Breeds included in RDP	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**2**	**1**	**0**	**0**	**0**
SPAIN	Breeds at risk	1	3	0	1	0	0	4	7	3	8	2	0	0	1	0	0	0	0	0	3	2	0	0	0	2	3	3	2	0	0	0	6	0	1	0	4	**7**	**23**	**8**	**12**	**2**	**4**
	Breeds included in RDP	1	3	0	1	0	0	4	6	3	8	2	0	0	1	0	0	0	0	0	3	2	0	0	0	1	1	2	0	0	0	0	6	0	1	0	0	**6**	**20**	**7**	**10**	**2**	**0**
SWEDEN	Breeds at risk	0	0	0	0	0	0	0	4	1	4	0	1	1	0	0	0	1	0	2	9	0	0	0	3	0	3	0	0	0	0	1	6	0	2	1	1	**4**	**22**	**1**	**6**	**2**	**5**
	Breeds included in RDP	0	0	0	0	0	0	0	2	1	3	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	0	**1**	**3**	**1**	**5**	**2**	**0**
UNITED KINGDOM	Breeds at risk	0	0	0	0	0	0	2	7	3	6	0	6	0	2	0	2	0	0	5	7	1	3	0	0	1	4	0	6	0	0	2	10	0	7	0	12	**10**	**30**	**4**	**24**	**0**	**18**
	Breeds included in RDP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL	**Breeds at risk**	**5**	**6**	**0**	**1**	**0**	**0**	**33**	**56**	**20**	**45**	**18**	**18**	**15**	**32**	**2**	**7**	**7**	**6**	**76**	**82**	**7**	**13**	**13**	**9**	**18**	**37**	**7**	**13**	**2**	**2**	**25**	**89**	**3**	**26**	**43**	**37**	**172**	**302**	**39**	**105**	**83**	**72**
	Breeds included in RDP	**4**	**6**	**0**	**1**	**0**	**0**	**9**	**24**	**13**	**30**	**17**	**0**	**5**	**12**	**0**	**5**	**7**	**0**	**9**	**27**	**5**	**6**	**13**	**0**	**6**	**9**	**2**	**0**	**0**	**0**	**8**	**36**	**3**	**11**	**42**	**0**	**41**	**114**	**23**	**53**	**79**	**0**

Source: FAO (DAD-IS Program), National RDPs
Note: C = Critical; E = Endangered; CM = Critical-Maintained; EM = Endangered-Maintained; NR = Not at Risk with decreasing trend of population included in RDP; NRD = Not at Risk with decreasing trend of population not included in RDP