Mediterranean pastoral systems and the threat of globalization

Pardini A.

in

Ferchichi A. (comp.), Ferchichi A. (collab.).
Réhabilitation des pâturages et des parcours en milieux méditerranéens

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 62

2004
pages 155-168

Mediterranean pastoral systems and the threat of globalization

A. Pardini
Department of Agronomy and Land Management, University of Florence, Italy

RESUME – *"Les systèmes pastoraux et la menace de globalisation". Les changes dans le monde économique ont déterminé des importantes variations pour ce qui concerne la valeur des pâturages et des parcours, au niveau local et global, en comprenant aussi le Bassin Méditerranéen. La compétitivité économique vis-à-vis de l'alimentation et de la production fourragère a été réduite par rapport à d'autres régions. Toutefois, les caractéristiques qui ont affecté négativement la production, fournissent aussi de nouvelles possibilités par rapport aux activités pastorales dans l'économie globale. En effet les pâturages ont augmenté leur importance pour les aspects biologiques et culturels. Beaucoup de moyens agronomiques traditionnels sont disponibles pour accroître la production animale et fourragère mais un nouveau approche est nécessaire dans la gestion de pâturage. Ce travail analyse les possibilités d'intervention, les différentes utilisations du sol et des ressources fourragères, l'attention croissante pour l'environnement et pour les traditions du territoire, la production et la certification de la qualité des produits et, finalement, le lien entre les productions pastorales et l'économie de la région méditerranéenne.*

Mots-clés : *Variabilité des ressources, qualité du territoire, diversification économique.*

Introduction

Over 26% of the earth's land is now pasture and rangeland, this area increases to over 65% when we refer to agricultural land. In the Mediterranean Basin around 80% of the land area is marginal and frequently mixed with different land uses (Galaty and Johnson, 1990), extensive grazing of livestock and wild animals is often the only possibility of valorisation.

Animal products and by-products, firewood and timber, medicinal plants, wild fruits and honey, are all part of rangeland-based economies and contribute traditionally to the survival and the economy of many peoples (Nair, 1993; Doria *et al.*, 1995).

Moreover research has already identified new values of plants native to pastures: food and pharmaceutical industries, restoration companies, genetic laboratories are using plants and genes of organisms that live in rangeland and will presumably valorize this biodiversity further in the future (Talamucci and Pardini, 1999), this can be easily understood if we consider that over 500 forage species are available in native pastures (Talamucci and Chaulet, 1989; Piano and Talamucci, 1996).

Pastures have also an important ecological role and contribute to the conservation of physical environment through improvements in surface water quality and groundwater recharge, reduced soil erosion, protection of life forms and diversity of the landscape.

Very recently, pastures have gained new importance from the diversities of knowledge, languages and traditions of pastoral people that, in a relatively modern conception, have been recognized parts of the general diversity (Salwasser, 1991; Gomez-Pompa and Kaus, 1992).

Nonetheless of the shift of values that determine changes in the use of the territory, it is understood that economic, ecological and cultural importance of pastures and rangeland will be even greater in the future, unfortunately these resources are often badly treated on a global and regional scale, included areas of the Mediterranean Basin and other world areas with Mediterranean climates.

The changing values of the Mediterranean pastures

Pastures cover about 130 million hectares in the Mediterranean Basin (Table 1), that is 51% of the agricultural land. The area occupied by grazing land is in dynamic equilibrium with crops and forests

(Talamucci, 1991), and it has increased little in the last 40 years. In fact the area reduction in European Countries has been balanced by increases in most of North African and Middle East Countries, as a result 2.6 million hectares only have been added. The new pastures have been got from forest and shrubland reclamation, and in limited areas even from reduction of permanent crops (FAO, 2002).

Table 1. Permanent pasture (PP) area, agricultural population (AP), and livestock in the 22 Countries of the Mediterranean Basin. Comparison between 1961 and 2001

Year	Permanent pastures (ha x 1000)	PP area (% of agric. land)	Agricultural population (x 1000)	AP (% of total population)	Livestock number (x 1000)
1961	128,002	50.0	117,999	50.5	268,113
2001	130,603	51.0	90,016	26.6	312,343
Difference	+ 2,601	+ 1	- 27,983	- 23.9	+ 44,230

In the same 4 decades the population of the Mediterranean Basin is largely increased and nowadays it is over 300 million people, this is due to high birth rates in North Africa and Middle East, to long life expectancy in Europe and to migration from other parts of the world. Population growth and urbanization have worked in opposition and the rate of rural population was maintained low. The total number of rural people is almost unchanged, however agricultural population has been reduced of 1.3 times, with significant differences between industrialized Countries and the others. Despite the reduction of people that live on agriculture, effective economy diversification is a reality only in European Countries and most people that live in other parts of the Mediterranean Basin still largely rely on primary land productions.

Livestock number is also increased of 1.2 times and it is nowadays over 300 million heads, including both intensive and extensive systems. Part of the livestock is housed in stables, but nevertheless pastures sustain most of the domestic livestock and a large number of wild grazers and browsers.

The Mediterranean Basin has been the most important cultural and economic area of the world for over two thousand years, this prominence was shifted to North Atlantic after industrial revolution, however, very recently, the progress of computer appliances have done possible the virtual integration of local communities within the general world economy. Up to now globalization has favored the general development also in the Mediterranean Basin, nonetheless local difficulties have been enhanced especially because agriculture and husbandry of the Mediterranean Countries are less efficient than in Northern Europe and America. As a result, the traditional economic importance related to primary resources of pastures is being reduced.

On the contrary, the Mediterranean Basin is probably the most dynamic area for population movements: people migrations in search of job from Southern and Eastern Countries and from other continents have the opposite direction than the seasonal movements of Northern European and many extra-comunitarian tourists. As an example, the number of registered annual tourists-days in Italy is almost 300 millions and it becomes three times more including esteemed presence, one fifth of which is esteemed to visit also marginal areas, these presence allow employment of 1.5-2 million people and move capitals for about 59 billions Euros (Legambiente, 2002). Mediterranean Countries benefit nowadays of the European common market that, if will be extended to the whole Europe, will comprise about 500 million people that share a diffused wealthy and will make it for the biggest market on the world.

Due to wealthy and to recent cheats of the food industry, there is a growing interest of many European customers for quality foods (Longhi *et al.*, 2002a, 2002b), especially organic and biodynamic. Customers international organizations are also pushing on FAO to advice against intensive animal husbandry and, contemporarily, to reduce meat consumption in developed Countries and to increase its quality. Consequently many producers are now more interested to environmental friendly farming systems than to maximize productions. As an example, food production in Italy is decreasing due to stock surpluses and limitations imposed by European regulations, nonetheless the

number of organic farms is increased to over 51,000 and occupy 8% of the Italian agricultural area making the largest national organic farming area in Europe (FAO, 2002; Legambiente, 2002).

As a consequence the biological and cultural importance of pastures are becoming more important than traditional animal productions (Parente, 1996). This change will benefit of resource differentiation and environmental protection.

Pasture utilization and degradation

The present conditions of the Mediterranean pastures are the result of a protracted influence of men and his herds on vegetation. However degradation was never excessive in the past due to low population density and limited livestock number. Human impact became excessive and negative on large areas only during the last century when it has not been balanced by the local improvements done. Under utilization and land abandonment become frequent and have started negative changes just in the last few decades. Lower quality and reduced productivity of the pasture ecosystem are the result of this irrational utilization (Mitchley and Ispikoudis, 1999).

Nowadays both under and over utilization are causes of pastures degradation (Fig. 1). These two categories also distinguish the conditions of two different cultural and economic areas of the Mediterranean Basin (Talamucci and Chaulet, 1989; Boyazoglu and Flamant, 1990; Papanastasis, 1997):

(i) Under utilization became important only in the last decades in large areas of the European Countries because the majority of the population is employed in industry and services instead of primary production.

(ii) Excessive utilization was common in all the Countries of the Basin up to the ‘70s and it is still frequent in the Southern and Eastern areas.

In the *Northern Mediterranean area* agriculture and pastoralism were developed slowly and contemporarily to the growth of population and improvements of technologies. The passage through favorable and unfavorable periods of the history has also landscaped a mosaic-type of territory where there is not predominance of any land use. The variability of land uses is often positive because increases ecological stability, however this is useless when the resources are excessively fragmented and can not play a role in the conservation of native plant and animal life forms. Moreover, excessive fragmentation reduces the economic efficiency and contributes to marginalization and abandon of large areas. Under grazing and land abandon are common causes of pasture degradation in all the Countries because they cause the passage of vegetation through degraded stages of a new forest colonization with shrubs encroachment and diffusion of a few cosmopolitan species that have low forage value. Moreover, wild fires and soil erosion are enhanced during the intermediate stages. There is increased sensitivity of vegetation to seasonal, inter annual and long term climatic changes because the number of native plant species is reduced. Plants and animal breeds selected out of the Mediterranean area are broadcast in the attempt to increase productivity and this causes temporary diffusion of not adapted genotypes followed by hybridization and lost of adaptive genes. Land use is somewhere very fragmented, especially in Italy, this reduces vegetation resilience and economic efficiency of the system.

In the *Southern and Eastern areas* the growth of population number and urbanization happened more abruptly than in the North and not contemporarily to the availability of technologies and capitals, as a result land use is often scarcely diversified and makes difficult the maintenance of different ecotones and biodiversity. The misuse of the territory has been more effective than in the Northern area due to excessive tree felling and overgrazing. This dynamic is also common to many rangeland of other climatic areas (Longhi *et al.*, 1999; Cavestro *et al.*, 2001; Pardini and Scorzon, 2001) that, consequently, will benefit of the solutions eventually found for the Mediterranean Basin. Excessive use of vegetation has caused the reduction of vegetation cover of the soil, the management of pastures is often sub-optimal and causes excessive stress to plants and negative changes in the botanic composition and productivity (Ferchichi, 1999; Gutman *et al.*, 1999; Abdelguerfi and Marrakchi, 2000). Desertification can be a final result in large areas.

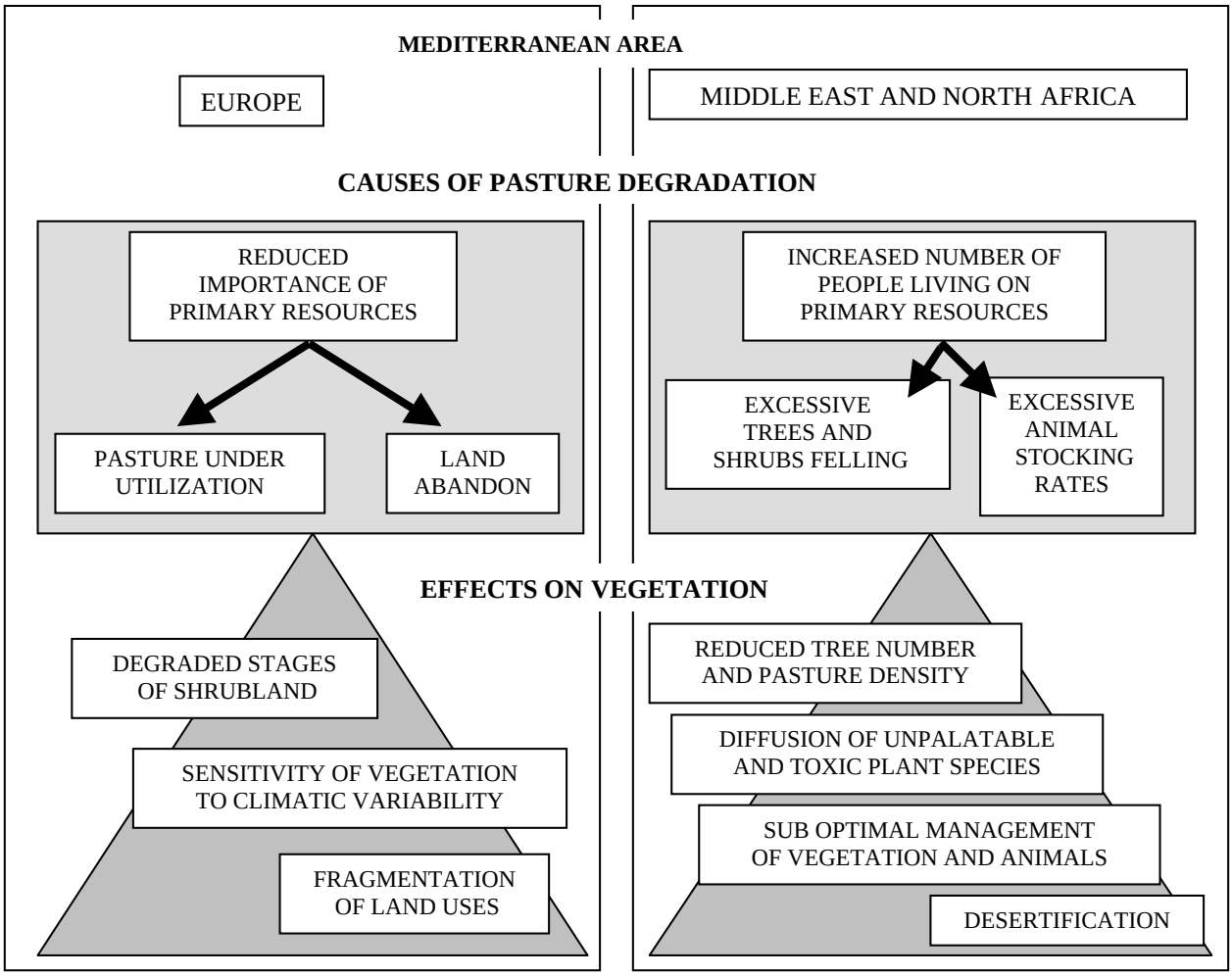

Fig. 1. Causes of pasture degradation and effects in the Northern and Southern areas of the Mediterranean Basin.

Positive or negative effects of grazing on vegetation depend on management (Gomez-Gutierrez and Perez-Fernandez, 1996). Only an excessive or too low number of animals is negative to pasture vegetation (Pardini *et al.*, 2000a; Pardini *et al.*, 2000b; Staglianò *et al.*, 2000). Nonetheless of the negative effects of an unbalanced number of grazers, the optimal animal stocking rate can have positive influences on both productivity and biodiversity (Fig. 2).

Effects on productivity

Positive effects of grazing on forage productivity are possible at the optimal animal stocking rate, when stress to plants is controlled and plants are stimulated to grow new young tissues with high photosynthetic efficiency and the old parts are frequently ingested. Soil fertility is maintained thanks to animals restitutions.

Negative effects are often due more to direct human influence than to his herds, in fact wood harvesting has caused sudden reduction of trees and shrubs density. The reduction of trees number has also a detrimental effect on herbaceous plants and causes worse seasonal forage availability.

Effects on biodiversity

Positive effects of the optimal stocking rate are possible on the number of plant species, in fact the changes provoked in the vegetation by grazers enable the contemporary existence of forage species typical of different ecosystems. The beside presence of plant species of different ecotones is

nowadays artificial, the present condition of the vegetation is reversible and continual optimal management is necessary to avoid reverse changes of botanical composition. Grazing can favor legumes with high forage value because this group of plants are often stimulated by high light intensity more than grasses. Nonetheless the diffusion of legumes is linked to grasses abundance that collaborate to optimize the balance of fixed nitrogen available in the soil.

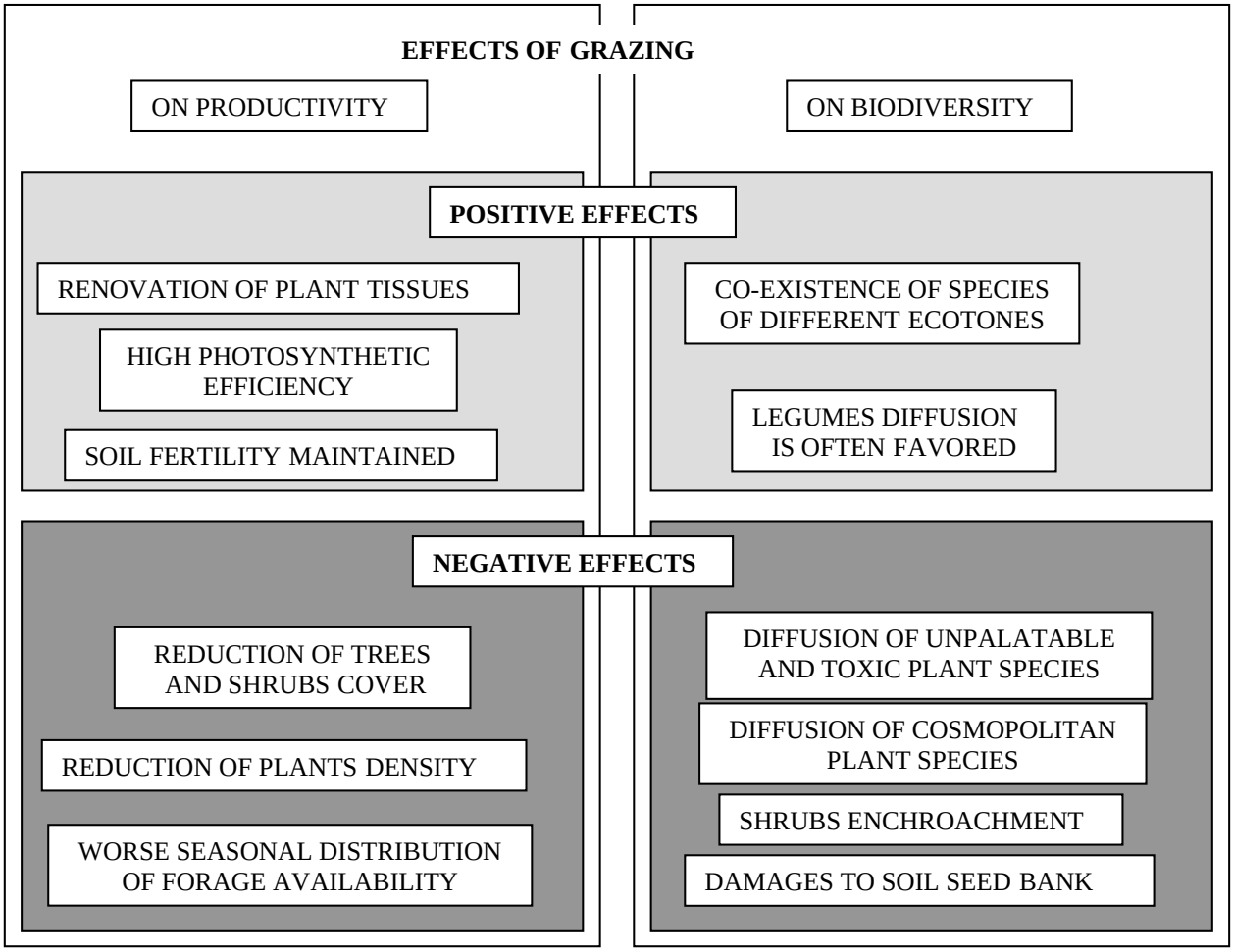

Fig. 2. Positive and negative effects of grazing on pasture productivity and biodiversity.

Negative changes in botanical composition concern the diffusion of unpalatable, toxic and cosmopolitan herbaceous species as well as shrubs encroachment, this is possible if animal stocking rate is too high or too low. Moreover most seeds can be eaten during the dry season if forage availability is reduced and their removal has dramatic and negative effects on vegetation resilience.

Changes in biodiversity are slow to become detectable in natural areas, the number of plant species becomes reduced over a lifetime and the length of this period is sufficient to allow adaptation in the human perception. The small daily changes are not perceived as a dangerous trend while unfortunately they can, in the long term, reduce the resilience of the ecosystem to environmental changes, and even reduce the possibility of developing more differentiated economies. The loss of biodiversity is exacerbated by both the simplification in land uses and the increase in international commerce and transport. Contacts with different civilizations in the past history have favored the introduction of exotic crops, many plant species native of other continents are nowadays naturalized and contribute to increase further the native high level of biodiversity. Unfortunately the introduction and diffusion of exotic plant species in agricultural areas has favored a few cosmopolitan annual species that have been spread all over large areas even if they are not the best adapted to the natural environments. However the present complexity of the agro-silvo-pastoral systems increases the ecological stability in the Countries of the Mediterranean Basin and will become even more important if

the extremes of climate parameters will be enhanced by the global climatic change. In fact some simplified systems of other geographical areas became unstable over a single century because they were based on very limited diversity (Jacob, 1951; Garraty and Gay, 1973; Ferdowsian *et al.*, 1996).

Due to the origins of the present vegetation from human activities, most of the pastures can not be further maintained without permanent management. Unfortunately the shifting from the economic prevalence of animal productions to ecological and cultural values has reduced the interest of local people in the resource, as a consequence the involvement of Governments and administrations is now necessary to guarantee proper management and to avoid pastures degradation.

Traditional and modern actions can be proposed to maintain or increase productivity and biodiversity in both Northern and Southern areas. Traditional interventions are common in self-sufficient economies and where primary products are the main source of incomes. However a modern approach is also possible in order to differentiate the incomes of the pastoral people. This will be possible if rural and urban economies will be integrated and the links of pastoral activities within the general world economy will be developed. Both classes of actions are discussed in the following paragraphs.

Traditional management solutions

Up to now, the principal parameter taken into consideration when estimating the value of a rangeland was forage production. Interventions were centered on limitations to cuttings and grazing, improvements to vegetation, animal management, facilities (Table 2).

Table 2. Traditional agronomic actions of pasture management

Action	Positive effects
Control of wood harvesting and shrub-tree felling in the pasture.	Good soil cover. Controlled soil erosion. Good seasonal forage availability. Maintenance of biodiversity and landscape beauty.
Replanting trees in the pasture.	Increased soil cover. Reduced soil erosion. Improved seasonal availability of forage. Increased biodiversity. Increased productivity.
Windbreaks or green fencing plantation.	Improved microclimate for pasture and animals. Increased productivity. Available grazing sectors. Increased biodiversity and landscape beauty.
Optimal animal stocking rate.	Optimization of animal production. High forage intake rate. Good pasture resilience.
Adoption of appropriated grazing techniques that might comprise different animal species.	Higher forage intake rate. Reduced selection of palatable plant species.
Animal rotation in grazing sectors.	Controlled effects of the animals on pasture. Improved seasonal forage availability. Easier agronomic practices on the pasture.
Controlled or prescribed pastoral fires.	Renovation of plant tissues. Temporary increase in soil fertility with limited negative effects. Reduced risks of wildfires.
Improvements on pasture vegetation (sowings, oversowings) and soil (cultivation, fertilizations).	Increased productivity. Improved quality of forage.
Valorization of Mediterranean genotypes of forage species.	Diffusion of productive and well adapted genotypes. Increased resilience of vegetation to short and long term climatic changes.
Valorization of Mediterranean animal breeds.	Good animal adaptation to climate. Reduced problems of animal health. Possibility of grazing in rough pasture and rangeland.
Handling facilities (watering points, loading areas, fences, grids, disinfectant baths…).	Easier and more rational management. Controls on animal movements and health.

Exhaustive discussion of this group of traditional interventions is already available in literature and will not be further discussed here (Heady and Heady, 1982; Hodgson and Illius, 1996; Pardini, 2000).

These actions can optimize the number of livestock with the optimal ordinary management, however they can only provide temporary solutions if the number of people living on primary products of the pasture increases and even if a population that has already limited its numeric growth wants to improve further its wealthy.

In fact the natural productivity of the ecosystem is a very difficult limit to overcome and when pasture productivity has been maximized no further improvements are possible unless effective new scientific advances and new technologies are available (Leith and Whittaker, 1975). In this final stage the economic diversification of the whole economy of the area or Country is necessary. Nowadays this is probably the condition all around the Mediterranean sea, and more comprehensive solutions are necessary to preserve the pastures, including the integration of local economies within a global perspective.

Possibilities for the development of modern pasture management

Land use diversification contributes to biodiversity and both, in turn, will favor the integration of pastoralism within the whole nationals economies. Under this point of view the beautiful landscapes and the existence of variety of vegetation types advantage the Countries of the Mediterranean Basin in comparison to different areas of the world. In a case study that investigated 40 pastoral systems, the number of different forage resources present in a single case resulted up to 8 with an average of 5 (Argenti *et al.*, 1999). Nowhere else in the world there is such a diversification as there is in the Mediterranean Basin: rangeland, native and sown pastures, forage crops, associations of several legumes and grasses, forage shrubs plantations, associations of pasture and forage shrubs, tree crops, grazed forests, sown firebreaks, sown skylanes, rainfed arable lands grazed after cereal harvesting, irrigated areas with intensive crops, are all parts of agro-silvo-pastoral systems and all together contribute to the maintenance of the biological value of the area (Papanastasis and Mansat, 1996; Etienne, 1996). Pastoral peculiarities like the surviving nomadism, short and long transhumance that nowadays is often mechanized, favor the valorization of the contrasts of the territory (Argenti *et al.*, 1996; Ferchichi, 2000). Contemporarily there is a great diversification of peoples, traditions, languages and cultures that increase the cultural value of the Mediterranean Basin.

From this point of view, plans of action aimed at the improvement of pastures and rangeland should not be limited to the forage and animal production. Of course the demand of primary resources remains important especially in North Africa and Middle East, however all future interventions should be planned also with a view to the multi-use of the territory and the integration of pastoral communities within the national and regional perspectives. The major possibilities of integration comprise: the production, certification and sale of quality foods; the development of new plant industries; the development of cultural and recreational uses of the territory. Finally, these three kinds of development should allow the linkage of pasture management to the rest of the economy (Fig. 3).

Production, certification and sale of quality foods

The low efficiency is unfortunately a negative side of extensive and diversified pastoral systems. In fact the presence of many and different resources implies peculiarities of management and consequently higher costs in comparison to intensive productions (AFPF, 1987). However animals are grown in a more natural environment and their meat and milk are healthier than those produced intensively. Preferences of many European customers are nowadays more attracted by good foods from natural systems than from cheap industrial products, this availability to pay more for quality can balance the higher costs of producing with a complex management (Papanastasis, 1999). The possibility to sustain pastoral development through quality foods is linked to actions of: food certification, sale organization, diversification of animal breeds and species, organization of hunting (Table 3).

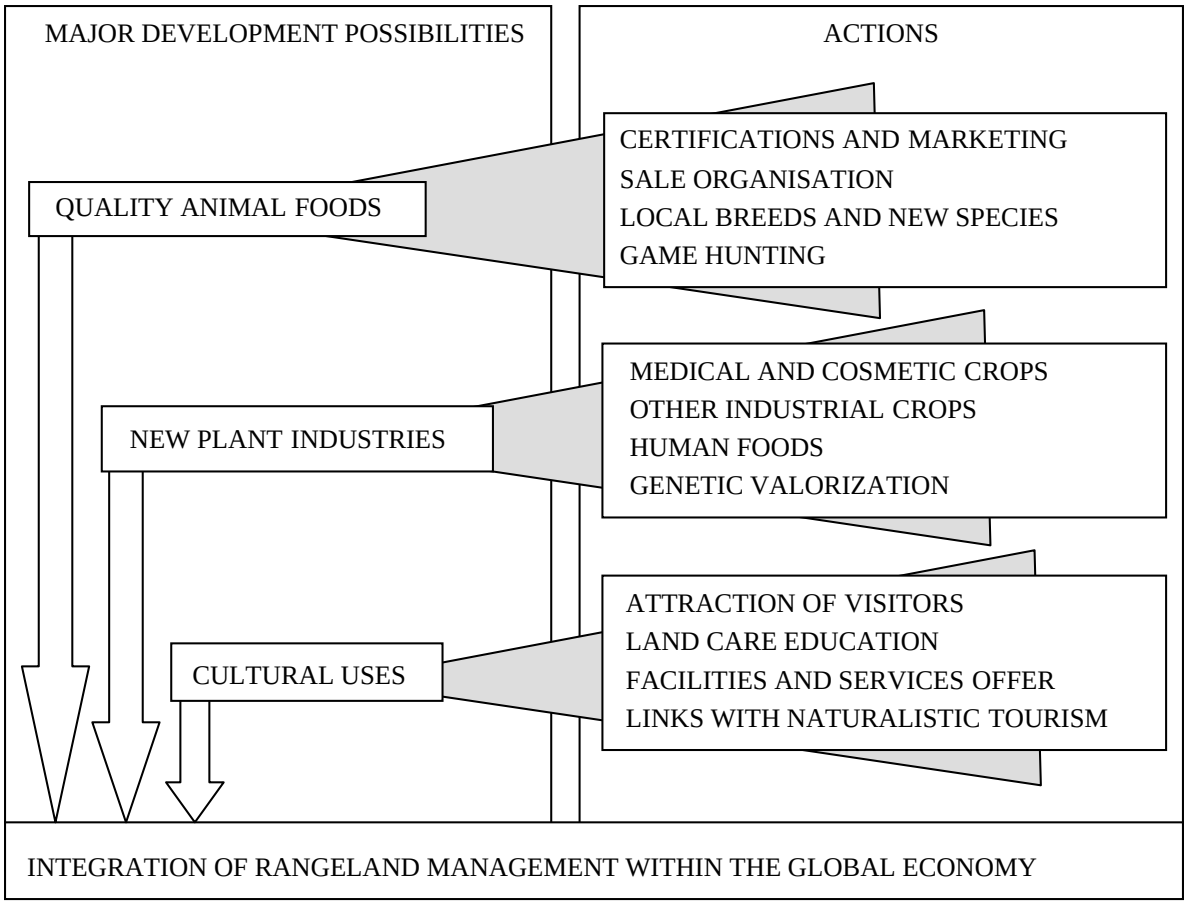

Fig. 3. Major possibilities to develop modern pastoral systems and actions necessary for their integration within the general economy.

Certification

Unfortunately quality productions are largely only *a matter of fact* in many Mediterranean Countries because controls are not always efficient or even not existing and consequently stocks can not be guaranteed. We must admit that many farms of Northern European Countries where animal products are mainly from intensive husbandry have been ready and quick to meet the new standards of the controls that guarantee organic foods, while certifications arrive late in the Mediterranean area.

Sale organization

Quality products are preferred when they are available straight from the producers, consequently pastoral enterprises need the organization of animal harvesting and meat processing with certification, and a network that makes the sale inside the farm possible as well as the sale in towns markets. Meat sailing straight in the farm allows also the development of game production and hunting, in turn this new industry favors the development of agro-tourism. Labeling typical products can help to valorize regional peculiarities in comparison to standardized foods.

Diversification of reared animal breeds and species

Customers are often more interested to buy products of local animal breeds instead of common cattle and sheep livestock. In some cases the preference of the grazing animal species can be given to horses because they can help the management with intense grazing, they can be used as tourist attraction and for back horse riding, and their meat is a food anyway. Moreover, new animal species are cropped in Mediterranean European Countries, these include several species of deer and even exotic animals like the ostrich whose not common meat attracts already a good number of qualified consumers.

Table 3. Actions necessary to develop new management possibilities of agro-sylvo-pastoral systems in the Mediterranean Basin

Action	Purposes
QUALITY FOODS	
Quality certifications	Sale rangeland products at higher prices than industrial food. Reduce the number of livestock where it is excessive.
In-farm sale organization	Sale foods at high price. Attract tourists to other services offered in the farm. Increase incomes for producers.
Crop local animal breeds and new species	Rise interest in labelled foods and even new meat types. Use of multi-purpose animal species.
Develop hunting in agro-tourism farms	Get much higher incomes than from sloughed animals. Self-rise funds for land management.
NEW PLANT INDUSTRIES	
Medical and cosmetic crops	Seek the link with medical industry. Develop new crops in fertile soils to self- rise funds for land management.
Other industrial crops	Seek links with different industries. Develop cash-crops in fertile soils to self-rise funds for land management.
Human food crops	Seek links with food industry. Develop cash-crops in fertile soils to self-rise funds for land management.
Genetic valorization	Increase basic knowledge. Valorize rangeland plant genotypes and single genes in view of new industrial uses.
CULTURAL AND RECREATIONAL USES	
Attract visitors	Increase the number of tourists. Diversify the demand of products and services.
Develop a land care thinking	Maintain landscape beauty. Rise the interest and the number of visitors. Increase the cost of offered services.
Develop facilities and services offer	Rise interest of tourists. Diversify income sources. Develop a secondary economy however related to land management.
Develop links with tourism	Develop land management with funds self-risen in rural areas. Invest capitals derived in rangeland management.

Organization of game hunting

Hunters can be stimulated to spend more spare time in agro-tourisms and to pay an animal hunted in the farm even ten times more its price from the butcher. Hunters will also make use of several facilities and services offered and thus contribute further to generate incomes for the farmers.

Development of new plant industries

The use of plants native of the rangeland is not only related to forage productivity as well as also to industrial uses and the incomes possible from the modern use of forage plants are much higher than what is possible from their traditional use, the derived capitals can be destined to the management of the territory. Over 4% of the arable land is now non food crops in the European Union and this area is destined to be increased further (Mosca and Venturi, 2001). The actions possible to sustain land management through new plant industries are: *cropping of medicinal and cosmetic plants*, *the production of other industrial plants*, *the cropping of human food plants*, *the genetic valorization of native plants*.

Medicinal and cosmetic crops

Several antioxidants and films to include pharmaceutical molecules are got from rangeland native plants. Red clover is already a food given in hospitals to support estrogens based treatments, subterranean clover is also being selected for similar uses. The use of vegetal oils in cosmetic products is increased after the diffusion of concerning about animal fats due to the mad cow disease (Mosca and Venturi, 2001). Several forage plants can be important crops to destine in fertile soils and the high incomes possible can be used for the management of pastures.

Other industrial plants

Alfalfa dehydration is probably the most known industrial process for forages, however there are also other possibilities. Few forage species are already used to produce paper, amid and biomass. At the moment this is done with common double use crops: *Sorghum bicolor, Zea mays, Hybiscus cannabinus* and research is already investigating other forage plants. Plants native of rangeland have proved to be useful in producing fuels and materials are derived to produce totally recyclable plastics and even tires. Much scientific research remains to be done in this area.

Human foods

There are traditional and modern foods that can be produced in pastures and rangeland. Honey is a common example of the first group. The so called “healthy foods”, available in many markets or in pharmacies and derived from native plant species, are examples of modern products used in diets and healthy treatments. Moreover some green foods are available in European and foreign markets: red clover, alfalfa and soya seedlings are examples. These species can be considered cash crops in fertile soils and the incomes of their sale to industries can be used also for land management.

Genetic valorization

Includes breeding of native plants and even the transfer of single genes or groups of genes from these species to other crops. Of course the attempt to develop innovative uses of plants needs larger genotypes collection, selection, registration, and commercialization (Porqueddu *et al*., 2000) and can comprise seed production abroad in change of royalties. The Mediterranean Basin is a huge source of genotypes that can be extremely useful to the Countries of this area, to the other Mediterranean regions of the world and even in areas with slightly different climates. Nevertheless we must admit that, sometime, foreign Countries have been able to valorize Mediterranean genotypes more efficiently than ourselves, and local genotypes have been introduced abroad, selected and now they are sold back to our farmers (Hughes and McLachlan, 2000; Norman *et al*., 2000). Scientific research might have a fundamental role in developing this action.

Development of cultural and recreational uses of the territory

Large capitals and technologies are necessary to maintain and eventually restore good conditions of the vegetation. Unfortunately Governments will probably have more and more difficulties to fund management of rural and pastoral territories, especially because urbanization will increase further and the economic importance of towns will grow in comparison to that of grazing lands. In the future the capitals that are necessary for conservation of pastoral areas might become available only if links with modern sectors of the economy will be developed. The development of these links can be supported by action of: *attracting higher number of visitors*, *development of a land care mentality*, *development of facilities and services*, *development of links with environmental protection and tourism*.

Attracting visitors

This can be possible thanks to the growing demand of services related to natural sites, that can support the development of a new sector of the rural and pastoral economy not strictly related to primary production as well as to ecological meanings. Of course the interest of urban people for pastoral areas can be increased only if the territory will be properly managed.

Land care

Tourists enjoy to see wild nature and conservation areas well preserved, this is already evident in the Mediterranean Countries and however education to land care is still nowadays more common in Northern Europe. The development of a land care mentality should be favored by education starting from the school level.

Facilities and services

Some foreign Countries teach how incomes can be increased in rural areas by the setting of

facilities like lookouts, camping areas, equipped routes, and with the organization of trekking, back horse riding and similar services. However the availability of facilities can sort an effective interest: some published researches have pointed out the availability of tourists to pay more for well organized services and good management (Pardini *et al.*, 1999; Pardini *et al.*, 2002a). Education, extension, training of guides, are all very important to support cultural interests and a related economy. Many people are already employed as naturalistic guides in both Northern and Southern Countries, and their number could be largely increased by further development of eco-tourism.

Link with environmental protection and tourism

Large marginal areas that have an important role for environmental protection can not be cropped and might produce incomes only by extensive grazing and tourist activities. Sown ski-lanes and firebreaks can be managed by animals grazing, however these sowings have a prominent role of environmental protection and can generate incomes from tourism (Argenti *et al.*, 2002). Sown firebreaks can be part of inside farm road systems that are used for back horse riding and four wheel drives and where grass is kept short by animal grazing (Talamucci *et al.*, 1995; Caredda *et al.*, 2002). Moreover, cover crops are useful in vineyards, olive groves and fruit orchards because they increase the ecological stability of the agricultural systems (Masson and Gintzburger, 2000) and they can produce incomes by high quality foods that can be sold to tourists straight in the farm.

Linkage of pasture management to the rest of the economy

Development will not occur in pastoral areas in isolation from the rest of the Country (Lusigi, 1995). Land use planning for production and sale of quality food, innovation in plant industries, conservation of landscape beauty, development of cultural and recreational uses of the territory must be planned within the general strategy of the national economic development (Gomez-Sal, 1997). In fact the changes in the general economy influence the uses of the territory through the availability of roads, camping areas, hotels, travel agencies, service companies for the management of the territory (Pardini *et al.*, 2002a; Pardini *et al.*, 2002b). A fast development is not possible if services available locally are not known at a national and international level and bound to a network of operators, the availability on the Internet of agro and pastoral tourism-farms is useful, this approach is already very common in more advanced Countries and should be further developed in the Mediterranean Basin. The necessity to be related to the rest of the economy will also contribute to push rural and pastoral economies into a more dynamic condition and to open the mentality of rural people that, in many cases, have had less cultural means than people living in towns. The introduction of modern approaches in local pasture management can be done still conserving the traditions of the people (Mitchel and Ispikoudis, 1999; Perevolosky and Etienne, 1999).

Conclusions

Nonetheless of the difficulties due to the impact of globalization, the regional peculiarities of the Mediterranean pastoral systems can be valorized. However, if modern uses of the territory have to be increased in the future, their planning must take into consideration not only primary productivity of the vegetation as well as also the biological value and the land vocation to support recreational and cultural activities.

The land use planning will benefit of the adoption of GIS programs and related technologies (Moriondo *et al.*, 2001) that can contribute to identify cases of local wrong uses of the vegetation resources and to plan their change on a territorial scale. As an example, many small pastures, meadows, fruit orchards or cropped fields scattered in hilly or mountainous areas have no economic relevance and, at the same time, they reduce landscape beauty and can increase soil erosion, on the other hand, some clearings can contribute to forage availability for wild animals especially thanks to browsing of the hedges. Similar cases can be easily identified from satellite remote sensing and aerial pictures and consequently they can be dismissed from their present use and probably left to the new introduction of the forest. In the opposite case of excessive deforestation, it is important to consider that the continuity of natural vegetation is necessary for the maintenance of wild life, especially game that needs large territories. The contacts between individuals of an animal species are not favored if the total area of native vegetation is large and however fragmented, this, in turn, increases the genetic inbreeding.

Territory management can be improved after the identification of the cases of misuse of native vegetation. Pastures can be conserved either for animal production and for landscape beauty or for both. However grazing might be concentrated in areas chosen for conservation of this resource, this will also contribute to the efficiency of service herds that are maintained just to keep the grass short and the pasture attractive for tourists (Talamucci *et al.*, 1996). On the contrary, the pastures that do not fit well for animal production or landscape beauty can be gradually dismissed after a guided management for forest reintroduction. Land use planning is useful also to identify the pastures where shrubs or trees reintroduction is necessary due to long term protracted overgrazing. In both cases of guided abandon and improved management of pastures, planning should also point out the areas where the facilities should be placed in order to improve the services for the tourists.

The potential incomes derived from cultural uses of the territory is huge and pastoral areas can largely benefit of them, however it is important that Governments and administrations will give regulations to favor and control the use of these capitals for the management of the pastures and rangeland. In fact there is the risk that large amounts of money will be destined to further immediate economic development instead than to land conservation, this is due to the opportunistic mentality resident in people that had been traditionally working with the slow cycles of plants and animals and had never had to consider a long term management planning in a quickly changing economy and society.

Independently of the new trends of pasture management that pastoral communities will be able to developed in the future, the conservation of a closed pastoral perspective will not be possible anymore and its integration within the general global economy can not be avoided. Conditions of peace and respect of the great regional variety of cultures and traditions will be necessary to favor interaction of different people and economies.

References

Abdelguerfi A., Marrakchi M., 2000. Les ressources phytogenetiques fourrageres et pastorales: de l'erosion a la cosnervation. Options méditerranéennes, 45, 15-27.

AFPF (Association Francaise pour la Production Fourragere), 1997. La foret et l'elevage en region méditerranéenne francaise. Fourrages, September.

Argenti G., Bianchetto E., Lombardi P., Sabatini S., Staglianò N., 1999. Some examples of Mediterranean pastoral systems. Publ. DiSAT, Florence, 64 p.

Argenti G., Bianchetto E., Sabatini S., Staglianò N., 2002. Vegetal evolution in revegetated ski slopes in an Alpine environment. Proc. XIX EGF meeting, La Rochelle (F), 758-759.

Argenti G., Talamucci P., Staglianò N., Gusmeroli F., 1996. Primi risultati sulla possibilità di riequilibrio di sistemi pastorali attraverso la transumanza tra ambienti mediterranei e alpini. Riv. di Agron., 3suppl., 408-413.

Baker M.J. (editor), 1993. Grasslands for our world. 865 p. SIR Publishing. Wellington, New Zealand.

Boyazoglu J., Flamant J.C., 1990. Mediterranean systems of animal production. In: "The world of pastoralism". The Guilford Press, New York, 353-393.

Caredda S., Franca A., Seddaiu G., 2002. Firebreaks oversowing: an alternative tool for the wildfire risk reduction in Sardinia. Proc. XIX EGF congr., La Rochelle (F), 908-909.

Cavestro L., Pardini A., Angeloni A., Innocente S., 2001. An outlook of pastoralism in Northern Somalia after the civil war. Journal of Agriculture and Environment for International Development, 2-3, 149-186.

Doria C., Medina J.R., Medina A.L., 1995. Multiple use of rangelands in northern Mexico. Proc. V Int. Rangel. Congr., Salt Lake City, Utah, 46-51.

Eldridge D., Freudenberger D. (editors), 1999. People and rangeland building the future. Proceedings of the VI Int. Rangel. Congr., Queensland, Australia, 2 volumes 1072 p. Printed by Elect Printing, Fyshwick, Australian Capital Territory.

Etienne M., 1996. Research on temperate and tropical silvopastoral systems: a review. In: "Western European silvopastoral systems", INRA, Paris (F), 5-22.

FAO, 2002. Statistical databases. Http//www.fao.org.

Ferchichi A., 1999. Les parcours de la Tunisie présaharienne: potentialités, etat de désertification et problematique d'aménagement. Options méditerranéennes, CIHEAM Zaragoza, 39, 137-141.

Ferchichi A., 2000. Rangelands biodiversity in presaharian Tunisia. Options méditerranéennes, 45, 69-72.

Ferdowsian R., George R., Lewis R., McFarlane D., Short R., Speed R., 1996. The extent of dryland salinity in Western Australia. In: Proc. IV National Workshop on the Productive Use and Rehabilitation of Saline Lands, Albany, March 1996, pp. 88-89.
Foti S., Cosentino S.L., 2001. Colture erebacee annuali e poliennali da energia. Riv. Agron., 35, 200-215.
Galaty J.G., Johnson D.L., (editors), 1990. The world of pastoralism. The Guilford Press, New York, 436.
Garraty J.A., Gay P., 1973. Storia del mondo. Vol. III. Oscar Mondadori (Italy), 1164.
Gomez-Gutierrez J.M., Perez-Fernandez M., 1996. The “dehesas”: silvopastoral systems in semiarid Mediterranean regions with poor soils, seasonal climate and extensive utilization. In: “Western European silvopastoral systems”, INRA, Paris (F), 55-70.
Gomez-Pompa A., Kaus A., 1992. Taming the wilderness myth. BioScience 42, 271-279.
Gomez-Sal A., 1997. Relationship between ecological and socio-economic evaluations of grazing in Mediterranean ecosystems. Proc. Int. Workshop on: “Ecological basis of livestock grazing in Mediterranean ecosystems”, Thessaloniki (Greece), 275-286.
Gutman M., Perevolosky A., Ungar E.D., Sternberg M., Kigel J., 1999. Mediterranean herbaceous vegetation response to high animal density and grazing deerment: implications for management and conservation. Options méditerranéennes, CIHEAM Zaragoza, 39, 161-164.
Heady H.F., Heady E.B., 1982. Range and wildlife management in the tropics. Longman, New York (USA), 140.
Hodgson J., Illius A.W., 1996. The ecology and management of grazing systems. CAB International, Oxford (GB), 466.
Hughes S.J., McLachlan, 2000. Activities of the Australian medicago genetic resources centre. Options méditerranéennes, 45, 73-77.
Jacob H.E., 1951. I seimila anni del pane. Garzanti (Milano, Italy), 470.
Legambiente, 2002. Ambiente italia 2002. Edizioni Ambiente, Milano (I), 252.
Leith H., Whittaker R.H., 1975. Primary productivity of the biosphere. Springler Verlag, Berlin (D).
Longhi F., Pardini A., Grammatico V., 1999. Biodiversity and productivity modifications in the Dhofar rangelands (Southern Sultanate of Oman) due to overgrazing. Accepted for publication at the VI Int. Rangel. Congr., Townsville, Queensland, Australia, July 1999.
Longhi F., Pardini A., Mattii G., Snowball R., 2002a. Cultivar choice for cover cropping and soil erosion control in Tuscan vineyards. Proc. V International IFSA (Int. Farming Systems Association) Sym., April 2002 (Florence), 835-836.
Longhi F., Pardini A., Orlandini S., Moriondo M., 2002b. Cover crop to improve vineyard ecology. Proc. V International IFSA (Int. Farming Systems Association) Sym., April 2002, Florence (I), 450-459.
Lusigi W., 1995. Future of the traditional pastoralism and resources use in the modern African State. Proc. V Int. Rangel. Congr., Salt Lake City, utah (USA), 94-95.
Masson Ph., Gintzburger G., 2000. Les léguminouses fourragères dans les systèmes de production méditerranéens: utilisations alternatives. Option Mediterraéennes, 45, 395-406.
Mitchley J., Ispikoudis I., 1999. Grassland and shrubland in Europe: biodiversity and conservation. Proc. Int. Occ. Symp. of the EGF, Thessaloniki, Greece, 239-251.
Moriondo M., Crisci A., Longhi F., Orlandini S., Pardini A., 2001. Assessment of erosion risk due to rainfall at regional scale. Proceedings of V ECAM (European Conference on Application of Meteorology) and EMS (European Meteorological Society) meeting, 24-28 September 2001, Budapest (Hungary).
Mosca G., Venturi G., 2001. Le produzioni agricole a uso non alimentare: attuali prospettive di sviluppo. Riv. Agron., 35, 155-162.
Nair P.K.R., 1993. An introduction to agroforestry. Luwer Academic Publishers.
Norman H.C., Ewing M.A., Loi A., Nutt B.J., Sandral G.A., 2000. The pasture and forage industry in the Mediterranean bioclimates of Australia. Options méditerranéennes, 45, 469-476.
Papanastasis V.P., 1997. Livestock grazing in Mediterranean ecosystems: an historical and policy perspective. Proc. Int. Workshop on: “Ecological basis of livestock grazing in Mediterranean ecosystems”, Thessaloniki (Greece), 5-10.
Papanastasis V.P., 1999. Grasslands and woody plants in Europe with special reference to Greece. Proc. Int. Occ. Symp. of the EGF, Thessaloniki, Greece, 15-24.
Papanastasis V., Mansat P., 1996. Grasslands and related forage resources in Mediterranean areas. Proc. XVI EGF meeting (Grado, Italy), 47-57.
Pardini A., 2000. Pascoli e foraggere tropicali e subtropicali. Ipertext on CD-Rom vers. 2.1, EuroPlanet informatica S.r.l., Firenze, Italy.

Pardini A., Argenti G., Staglianò N., Sabatini S., 1999. Grazing management for land multiple-use in an Italian Mediterranean environment. Proc. VI Int. Rangel. Congr., Townsville, Queensland, Aus.
Pardini A., Lombardi P., Longhi F., Ongaro L., 2000a. Animal stocking rate in tropical and subtropical rangelands. I. Pastoral value of the forage species. Journal of Agriculture and Environment for International Development, 4.
Pardini A., Longhi F., Grammatico V., Zari A., 1997. Evoluzione del ruolo dei pascoli nell'economia pastorale del Sultanato di Oman. Riv. Agron. Tropicale e Subtropicale, 3-4, 319-343.
Pardini A., Longhi F., Lombardi P., Argenti G., 2000b. Animal stocking rate in tropical and subtropical rangelands. II. Comparison of methods for the calculation. Journal of Agriculture and Environment for International Development, 4.
Pardini A., Mosquera M.R., Rigueiro A., 2002a. Land management to develop naturalistic tourism. Proc. V International IFSA (Int. Farming Systems Association) Sym., April 2002.
Pardini A., Scorzon A., 2001. Preliminary researches on the pastoral resources of the Soqotra Island (Yemen). Journal of Agriculture and Environment for International Development, 1, 3-28.
Pardini A., Tallarico R., Volterrani M., 2002b. Turfs to develop and improve the link between rural and urban economy. Proc. V International IFSA (Int. Farming Systems Association) Sym., April 2002 (Florence), 831-832.
Parente G., 1996. Grassland and land use systems. Proc. XVI EGF meeting (Grado, Italy), 23-34.
Perevolosky A., Etienne M., 1999. La gestion raisonée des parcours du Bassin Méditerranéen: un défi pour le XXI siècle. Options méditerranéennes, CIHEAM Zaragoza, 39, 129-136.
Piano E., Talamucci P., 1996. Annual self-regenerating legumes in Mediterranean areas. Proceedings XVI EGF meeting, (Grado, I), 865-878.
Porqueddu C., Ledda L., Roggero P.P., 2000. Role of forage legumes and constraints for forage legume seed production in Mediterranean Europe. Options méditerranéennes, 45, 453-460.
Salwasser H., 1991. Diversity: new perspectives for sustaining diversity in U.S. Nation Forest Ecosystems. Conserv. Biol., 5, 567-569.
Skerman P.J., Cameron D.G., Riveros F., 1988. Tropical forage legumes. FAO publish: "Plant production and protection series, n. 2", Rome. 692 p.
Staglianò N., Argenti G., Pardini A., Sabatini S., Talamucci P., 2000. Ipotesi di gestione di pascoli alpini con il pascolamento minimale per la conservazione delel risorse. Riv. di Agron., 1suppl., 193-197.
Talamucci P., 1991. Pascolo e bosco. L'Italia Forestale e Montana, XLVI, 2, 88-117.
Talamucci P., Argenti G., Pardini A., Scarpelli P., Staglianò N., 1996. Examples of high pastures management with minimal stocking rate in an area of Italian Alps. IX meeting of the group FAO-CIHEAM on Mountain Pastures, Banska Bystrika (Slovacchia), June 20-23th, 1996.
Talamucci P., Chaulet C., 1989. Contraintes et évolution des ressources fourragères dans le bassin méditerranéen. Proc. XVI Int. Grassl. Congr., Nizza, (F), 1731-1740.
Talamucci P., Pardini A., 1999. Pastoral systems dominated by fodder crops harvesting and grazing. Options méditerranéennes, 39, 29-44.
Talamucci P., Pardini A., Argenti G., Staglianò N., 1995. Functioning of a sylvo-pastoral system based on different resources, including firebreak lines utilized by sheep. Meet. FAO on "Sylvo-pastoral systems" in Avignone (F), Options méditerranéennes, vol. 12, 179-182.
Vallentine J.F., 1989. Range development and improvements. Academic Press Inc., San Diego USA. 524 p..
West N., 1993. Biodiversity of rangelands. J. Rangel. Manag., 46: 2-13.