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Ollé Marrugat F.

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The evolution of fodder dehydration in Spain: Future prospects

F. Ollé Marrugat
Interprofessional Association of Spanish Fodder (AIFE), Avda.Tortosa 2, 25005 Lleida, Spain

SUMMARY – Spain has become the EU leader, in terms of dried fodder, with a production of approximately two million tons. This is due to the Spanish agronomic potential and to the adaptation of the dehydrating industries to the requirements of the EU Common Organisation of Dried Fodder Markets. The Spanish climatic conditions favour a dehydration system, which combines the artificial drying techniques together with the exploitation of the solar radiation which partially makes up for the high cost of irrigation. There are around 170,000 ha in Spain dedicated to fodder transformation, principally located in the area of the Ebro Valley (80% of the total surface). However, production in Castilla-La Mancha and cultivation in the north-east of Spain have recently also acquired importance, with lucerne as the main crop and representing 92% of the total production. The rest of the crops are vetches, raygrass, fescue and forage corn. There are 82 industries that transform the raw material, with a potential capacity of around 2.9 million t. The transformed product is offered in different formats: short fibre (granulated format), long fibre (briquettes) and bales. The latter have obtained an unprecedented commercial success due to their adaptability to the stockbreeding sector's demand. Future prospects for dehydrated fodder are optimistic, since Europe has an important deficit as regards to vegetable protein production. The sector ensures the traceability, homogeneity, sustainability and respect for the environment required by the EU Agricultural Policy.

Key words: Alfalfa, vetches, long fibre, vegetable protein.

RESUME – *"Evolution de la déshydratation de fourrages en Espagne : Perspectives futures". Dans le secteur des fourrages transformés, la conjonction du potentiel agronomique espagnol avec l'adaptation des industries de déshydratation selon les conditions fixées par l'Organisation Commune des Marchés de fourrages asséchés de l'Union Européenne a converti l'Espagne en leader européen du secteur, avec une production avoisinant les deux millions de tonnes par an. Les conditions climatologiques espagnoles favorisent un système de déshydratation en conjuguant les techniques de séchage artificiel avec le bénéfice des radiations solaires qui compense en partie le coût élevé de l'arrosage. La superficie espagnole qui est consacrée à la transformation de fourrages est d'environ 170 000 ha situés principalement dans la zone de la vallée de l'Ebre qui en compte 80% du total, bien que ces dernières années la production ait augmenté en Castilla-La Mancha et que, dernièrement, la culture se soit étendue au Nord-Ouest espagnol. La luzerne y est l'espèce prédominante avec un 92% du total de la production, le reste étant formé par vesce, ray-grass, fétuque et maïs de fourrage. Pour transformer la matière première on compte 82 industries ayant une capacité potentielle d'environ 2,9 millions de t. Le produit transformé est offert sous différents formats, fibre courte-granulé, fibre longue "briquettes" et balles, celles-ci ayant acquis un succès commercial sans précédent par ce format particulièrement adapté aux besoins de la demande du secteur des éleveurs. Dans une Europe qui manifeste un grave déficit en production de protéines végétales, les perspectives de futur des fourrages asséchés devraient être obligatoirement optimistes puisque le secteur assure le cheminement, l'homogénéité, le soutien et le respect de l'environnement exigé aujourd'hui par la politique agraire de la communauté.*

Mots-clés : *Luzerne, vesce, fibre longue, protéines végétales.*

Introduction

The cultivation of fodder, and in particular of lucerne, as a raw material to be transformed using a dehydration process does not represent a significant part of the total Spanish agricultural production. Nevertheless, if it is analysed in relation to all the extensive crops that grow in irrigated land, fodder, and particularly lucerne, have become one of the most important crops on Spanish irrigated land.

In Spain, the fodder produced for its transformation has greatly increased since 1986, when Spain entered the EU with full rights. The production has increased from about six thousand tonnes that year to nearly two million tonnes in 2000 (Ollé, 1997, 1998, 1999, 2000).

The most important reason for this growth is to be found in the agricultural potential of the land, water and climate of the Spanish irrigated areas, together with the adaptation of its industry to the transforming conditions and to the market demands. The Common Organisation of Dried Fodder Markets (CMO), presently governed by Common Agricultural Policy (CAP), has been the unifying element for these potentials. This CMO has stimulated the existing potentials, and created a production-industrialisation group. This, in turn transformed the Spanish fodder dehydration sector into an agricultural sub-sector making it the production leader in Europe, and one of the first in the world.

The recent and present health crisis caused by the Bovine Spongiform Encephalopathy has revealed that Europe suffers a serious and chronic lack of vegetal proteins. It only covers about 70% of its needs, in a market with a yearly growth of 3%. The application of a CMO in the dried fodder sector is justified by the need to cover part of the lack of a strategic product for Europe, because Lucerne, as a plant, can provide a greater amount of vegetal proteins per cultivated hectare. Although this is an important objective, there are also other aspects concerning the cultivation of fodder. These coincide with the strategic lines of the European Agricultural Policy, which are included in the so-called Agenda 2000. These aspects are based on the environment and rural balance. We should not forget that the fodder transformation industry, because of its intrinsic special conditions, has to be established in the areas of production. It therefore contributes to the rural balance aimed at creating employment in the area, whether it is directly or indirectly. All in all, regarding the present situation in which the European consumer does not trust the health guarantees of food, the European sector of fodder transformation will have to analyse and discuss its guidelines.

The Spanish sector would also like to contribute to this discussion with its genuine production system, with the aim of adding it and trying to find a way to fit the other systems in the European Union. This will be done by looking at the immediate future challenges for the sector with optimism, and will be expressed in important questions such as the revision of the present CAP for 2006. This revision has been forced by the agreements of the Singapore Round where all the support systems for the agricultural sector will be revised, as well as the possibility of budget cuts in the new CAP, that will be put into effect from 2003 onwards. In addition, to get the fodder transformation sector to offer the levels of quality in keeping with the more and more demanding market requirements.

Background

It is well known that the production of fodder is seasonal and that the harvesting period in Spain spans from April to October. The seasonal character of production has forced to develop fodder preservation methods so that the excess production in summer can be stored and consumed in shortage periods. Basically, the techniques used to preserve fodder are: natural sun-drying (hay making), silage (a technique used in the south of Europe) and dehydration (mostly used in the north of Europe). While the former are conditioned by the weather, dehydration is an industrial process that, by means of a drier using different types of fuel (usually fuel oil, gas or coal). This artificially reduces the humidity of the fodder to a level where bacteria and fungi cannot grow, in order to avoid the decomposition of fodder proteins.

The important rise of the fuel prices in the 1970s created serious competition for the European dehydration industry. It reached a point where the European Economic Community, willing to have its own vegetal protein sources and not to depend on other countries' supplies (American soya), agreed to give financial support to the fodder transformation industry in 1978, so that it could go on with its activity. This support is given directly to industry production and it varies according to the evolution of prices of the products that substitute fodder in the international markets, and the evolution of the exchange rates of the national currencies.

The financial support is given at two levels: a higher one for the production of dehydrated fodder, and a lower one for the production of sun-dried fodder. The European regulation suggests that in order to receive higher financial support factories have to have artificial drying lines, and make a product of at least 15% of protein, and the humidity of the fodder when it leaves the factory cannot exceed 12%. It does not set a minimum for the fodder humidity when it enters the factory. Rules for the technical coordination of proceedings for the processing, control and payment of incentives for the dried fodder sector (European Economic Community, 1978; European Community, 1995).

When Spain joined the European Union in 1986, its fodder production was very reduced. This changed very quickly because industry rapidly adapted itself to the requirements of the European Union legislation. Moreover, new companies were created attracted by the possibilities of growing very fast and by the good profitability of the sector in a market that has always consumed its own production. This is because, up until now, it has never had problems with structural excess production present in other European agricultural sectors.

Spain became leader of the European production of the sector from the 94/95 campaign, thanks to yearly growth rates of 30%, recorded in the 1980s and the beginning of the 1990s. Its leadership has been gradually increasing up to 41% of the European production in the present campaign of 00/01, due to its yearly increase and to the production stabilisation. This could even be due to the decrease of the other member countries, especially France that was the previous leader of transformed fodder production.

From the 94/95 campaign, the Spanish production began to stabilise because it did not grow as much as in the previous years. In the 95/96 campaign its increase was even more negative due to weather conditions (drought) and conditions of the sector, because the sector itself agreed on the self-regulation of the production. In the last years, in Spain, there is a tendency to control the sector growing, although the previous estimates for the present 00/01campaign show us an important increase.

In 1994, the EU brought up, within the frame of the Reform of the CAP, a new financial support system for fodder dehydration. It is based on a budget limit [the Maximum Guaranteed Quantity (MGQ)], which is calculated with a fixed amount given to every produced tonne (68.83 ECU/t for the dehydrated fodder, and 38.64 ECU/t for the sun-dried fodder) applied to a National Guaranteed Quantity (NGQ) per state. This was the new average of production of each member country in the campaigns of 92/93 and 93/94. A co-responsibility clause of 5% was fixed, which means that any excess in the MGQ was globally fixed for Europe. When the excess was up to 5%, it had a penalty for all the countries without taking into account the responsibility of the country of the excess and, from 5% on, the penalty was for the country that had produced the excess.

The NGQ for Spain was 1,224,000 t of dehydrated fodder and 101,000 t of sun-dried fodder (SDF), but in 1994 Spanish production was already 1.4 millions tonnes. That is why Spain was the only one country in the EU that surpassed its NGQ from the very beginning and, since then, our country is said to be the main reason for the MGQ surpass. This has been taking place since the 98/99 campaign, and which has caused penalties of about 3 Euros/t for all European industrials. This has happened because the co-responsibility clause of 5% has been applied (FEGA, 2001).

It is worth mentioning that at the beginning of the 97/98 campaign, AIFE defended in front of the Central and Autonomous Administrations, asking for the regulation in Spain to be fixed to a minimum of 30% of humidity when the fodder enters the industry, so that the financial support given for dehydration could be received. It was also suggested that the average humidity of entry should be raised to 35% in the following campaign. It should be pointed out that the compulsory humidity minimum is not fixed in any other European country. With these measures two aims are achieved: the main one is that fodder enters with a necessary minimum humidity, so that the final transformed product meets the quality parameters required by the market, while it destroys the main reasons of the European competitors, which argued that Spain was dehydrating with low humidity contents. It is impossible to deny that Europeans process fodder with high contents of humidity. However, they do it because they are tight to their weather conditions whereas the Spanish weather conditions force them to use artificial irrigation despite the high expenses involved. This situation is almost unknown for the North-European producers.

A collateral argument, but not less important, in favour of the Spanish system of dehydration is that of using pre-drying techniques in the fields and the subsequent exploitation of sun radiation, which results in less pollution. This fact allows Spain to save around 300,000 to 350,000 tonnes of petrol equivalent, lowering 90% of the possible emission of atmospheric pollution, which would be emitted if the northern system was used. By taking advantage of solar energy, the Spanish sector of fodder drying contributes to the fulfilment of the EU proposal of reducing gas emissions of the greenhouse effect to 15% in 2010 compared to the level in 1990.

All in all, AIFE understands that the defence for the continuity of financial support for the transformation of fodder should not only be based on the argument of the costs of dehydrating, which is often used by the producer countries from the north, but on the need that the EU has of vegetal proteins.

Nowadays, the EU has a deficit of 70% of materials rich in vegetal proteins, with a market whose demand increases regularly 3% per year. The project for the new Vegetal Protein Plan for Europe proposes, as a minimum objective, the maintenance for the EU of a cover rate in vegetal proteins from 35 to 45%. In this sector, the Spanish fodder production with a high protein content puts forward an argument of special importance in the defence for financial support for the European drying fodder. There is an open debate because the basis of a future reform of CAP is being set up and, at the same time, agro-ecological and agro-industrial policies acquire great importance within the European context.

Crops and area devoted to grow fodder for transformation

In Spain, lucerne is the most outstanding type of fodder, with an average of 92%. It is followed by far by vetches with 2%, and the spare 6% are ray-grass, fescue, pasture from Sudan and fodder corn. The latter has an important increment in Aragón and Cataluña.

With regards to lucerne, the ecotype of Aragon is the most used (75%) since productivity and adaptation are very difficult to be surpassed by any other national or foreign varieties.

This paper focuses on the fodder area devoted to fodder growing for its transformation in drying industries since this fodder is the one regulated by CMO.

In this respect, it is important to note that the following data correspond to the area mentioned in the contracts of sale of fodder to be transformed. These are compulsory when applying for financial support. These contracts are handed in by the contractor industries to the Administrative Body of the provinces where they are situated and they have to appear as hectares of this province, although in many cases there is the possibility that these hectares are situated in bordering provinces.

The area used for growing fodder that is to be transformed has been increasing as the industries ask for a higher production of raw material aiming at fulfilling the needs of the market. In any case, the future development of hectares devoted to the growing of fodder in Spain is mainly tied to the evolution of substitutive crops (especially cereals). Any measures that affect the present equilibrium in favour of these substitutive crops could provoke a decrease in the number of hectares devoted to transformed fodder.

The geographical distribution of the Spanish area devoted to the transformation of fodder is clearly defined. This surface is initially situated in an area which we call Valle del Ebro. It is the basin of the above mentioned river which goes from Navarra to Cataluña (province of Lleida). In this area we can find more than 80% of the surface, that would be destined to fodder, growing for its transformation, although the rest of the irrigated land in Spain is increasing, in some cases amazingly. In the north-east of Spain, recent experiences show that areas that are nowadays devoted to pasture could be destined to produce fodder for its transformation. The area with the highest increase has been Castilla-La Mancha, which has tripled its fodder surface for transformation in only 5 years, whereas in traditional areas, the increase is lower and there has even been a decrease in the last two years (Llorca *et al*., 1998).

The Spanish production of transformed fodder

For the transformation of fodder, Spain has 82 dehydrating industries which are located in the rural nucleus of the producer areas. As it had to be, in accordance to the surface devoted to cropping, the highest number of drying industries is found in the area of Valle del Ebro, 56, between Aragón, Cataluña and Navarra. It is important to point out that almost all industries, placed in the rest of the autonomous communities have a shorter age of 6 years. For the next campaign, even a new industry in Galicia is about to be set up. This community did not have any industries even though it is one of the main consumers of transformed fodder.

According to a study carried out in 1999 by the Agricultural Engineering School of Lleida (Llorca and Masip, 1999), the theoretical potential of the Spanish dehydrating industries of fodder was said to be of 2.9 million tonnes per year, with entrance conditions of 35% average humidity. This over-estimation is caused by the fact that the majority of industries have improved their processes, with the objective of giving entrance without difficulty to the production of the first cuts of lucerne. These are the most productive and at the same time they have also increased the capacity to let in fodder with a higher humidity content.

The offer of transformed product

Traditionally, the industries of transformation, after the dehydration of the raw material, ground and then granulated the fodder meal. The main customer for the granulation of lucerne was, and still is, the industry of compound feeding stuffs. At the beginning of the 90s, the pastille or briquette of dehydrated lucerne was introduced into the market. This has the characteristic of offering the well known "large fibre", that is to say, a dried fodder which is not subjected to a grinding process. It is required by milk producers, since it increases the proportion of fats and proteins in the milk. It is also used by the stockbreeder with extensive cattle stock, in order to cover the shortfall in the pasture (remember the serious drought that the country has recently suffered). From 1993, the Spanish industrial sector, started to develop a new format which was so far unknown in Europe. It consisted of a dried fodder bale, whose characteristic was to offer a much longer fodder than the briquette (around 7-12 cm long of fibre), in packs that weighed between 200 and 800 kg, with good conditions of transport and reducing its costs. Introducing it into the market has been a real commercial success in the sector to the extent that this format has been adopted by a great majority of drying industries in Europe. The results have been very different because this format needs concordance between the quality of the raw material and the humidity of entry, since its optimum level is between 35% and 45% humidity of entry into the trommel. As the input humidity levels in the trommel are surpassed, it works at a higher temperature, producing an excessive drying of the fodder leave, or even its combustion. This has a negative effect on the quality of the final product offered.

Fodder dehydration in Spain: Future prospects

Once we have seen the global figures for the Spanish dehydrating sector, presented in the previous section, we should ask ourselves about its immediate future prospects. No doubt the main reason for its spectacular increase has to be found in the application of CMO to dried fodder. Therefore, any possible variation in the CMO or even its disappearance could play an essential part in the sector's continuity.

It is for this reason that the Spanish and European fodder dehydrating sector is trying to highlight its own high strategic value regarding European agricultural production, since it is one of the main vegetable protein production sources in Europe. For four years we have been stating that Europe cannot keep the serious deficit regarding materials rich in vegetable proteins. This deficit has increased due to the EEB crisis and the subsequent banning of consumption of feed made of animal-based meal.

Should the EU wish to apply coherent agricultural policies, it will have to encourage European production of vegetable proteins (dehydrated fodder, proteaginous and oleaginous crops), thus reducing the dangerous EU dependency on soya imported from non-EU countries. This, in turn, is the subject of a present debate on the suitability of its consumption, as it is widely believed that most of the American soya is genetically modified.

In this sense we should be optimistic about the future of the fodder dehydrating sector, as it is a necessary product which also meets all the requirements that present-day modern society demands to the CAP. These requirements are included in the "Agenda 2000" document.

The reasons that the dehydrating sector uses to claim for a higher degree of prominence are as follows. Leguminous fodder plants, especially lucerne, are the species which produce vegetable proteins, the most productive ones per surface unit, because they produce around 2500 kg of protein (on dry material) per hectare, as opposed to the 800 kg per hectare produced by soya. For this reason they are included in the Plan for Vegetable Proteins for Europe, which suggests as a minimum objective the keeping in the EU of a cover rate regarding vegetable proteins from 35% to 45%. This plan tries to reduce the exceeding dependence of the EU on the production from other countries and to increase the safety levels regarding the above-mentioned vegetable protein (i.e. genetically modified soya).

As far as food safety in fodder is concerned, the fodder dehydration process meets the traceability foreseen in the project of the Practical Code for a Correct Animal Feeding. This project has been developed by the "Codex Alimentarius" Commission, created within the framework of the joint programme FAO/WHO on food regulations because:

(i) Raw materials are purchased from reliable sources, farmers, farming cooperatives or industries.

(ii) Full guarantee offered by the supplier (farmer) in relation to whatever may come from his farm, either directly, through farming cooperatives or through the industries own management by means of contracts per hectare.

(iii) Industries must keep registers for raw materials.

(iv) Industries must declare any kind of mixture, including details and origin of additives.

(v) Industries must register production dates, production conditions, dates of departure, information on transport and destination of the product.

(vi) The Spanish dehydrating sector envisages the implementation of the product quality certificate for the next season through the application of a UNE regulation, which is now being drafted.

Dried fodder is a homogeneous product which offers the consumer-stockbreeder a higher quality degree at lower prices than those of the fodder produced by the stockbreeder himself, as transformation companies have more specialization and mechanization, thus achieving higher output and quality levels of fodder crops. At the same time the farmer is freed from cultivation, production and handling of feed for his livestock. As a result, the usage of transformed fodder sustains stockbreeding in areas which are not fodder producers, thus creating alternative incomes and employment in European agricultural areas where fodder crops cannot be produced with enough guarantees.

For the fodder producer, cultivation for dehydration is extremely interesting, as this is an important income balancer: there is hardly a variable production during its life cycle, a minimum influence of climatological accidents (such as frost or hail), together with remunerative retail prices. Furthermore, the cultivation of fodder for dehydration contributes to a sustainable agriculture by means of cultural practices that are environmentally respectful. During the life cycle of fodder that lasts for more than one year, a thick vegetable cover is kept which requires neither intensive herbicide usage, nor nitrogenous fertilizers, contributing to the reduction of water pollution and of the erosion of cultivable land.

Facilities for fodder transformation should be placed in the producing area, because the high humidity percentages found in fresh fodder significantly increase transport costs in such a way that makes it unfeasible to place the industry far from the producing area. By placing them in production areas the economic subsistence of small rural areas is favoured by means of direct employment in the factory itself, or by means of indirect employment with cultivation, harvesting, transport and facility maintenance works.

All in all, the fodder transformation sector has solid grounds to defend its importance as an essential piece of the CAP which ensures the economic sustaining and stability of rural areas, and at the same time traceability, sustainability and respect for the environment. These are essential conditions that urban society imposes on European agriculture.

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