

An overview of alfalfa (*Medicago sativa* L.) situation in Argentina

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Introduction - From the approximately 3.2 million ha of alfalfa grown in Argentina in 2018, about 60% is planted as pure stands and 40% in mixtures with temperate forage grasses. Pure stands are primarily used for dairy and hay production, while mixtures with grasses are usually devoted to beef production. More than 426 varieties have been registered between 1980 and March 2018, and about 120 varieties are currently in the market. Among these varieties, 65% belong to fall dormancy (FD) rates 8-10 and 35% to FD 6-7. The majority of those cultivars come from private companies, either domestic or international. Most of the new releases are provided by USA and, to a lesser extent, Australian breeding programs; however, INTA's varieties currently have about 15% market share. The National Alfalfa Cultivar Evaluation Network is being conducted by INTA Manfredi since 1992 in an attempt to help farmers in the process of choosing the most adapted varieties. This network has 17 locations across the country which represents the wide range of environmental conditions and production systems (rain fed or irrigated). Forage yield (t DM ha⁻¹ year⁻¹) and stand density (persistence) are statistically analyzed and published annually (Arolfo and Odorizzi, 2017). Results from the last 10 years show that average forage production for FD 5-7 cultivars ranges from 5 t (metric tons) DM ha⁻¹ year⁻¹ in Anguil (Semiarid Pampa Region-5 cuts) to 24 t DM ha⁻¹ year⁻¹ in Marcos Juárez (Sub-humid Pampa Region-6 cuts) under rain fed conditions; and 17.2 t DM ha⁻¹ year⁻¹ in Hilario Ascasubi (Southern Pampa Region-6 cuts) to 20 t DM ha⁻¹ year⁻¹ in Viedma (Northern Patagonia-6 cuts) under irrigation. For the non-dormant cultivars (FD 8-10), forage production ranges from 5.3 t DM ha⁻¹ year⁻¹ in Anguil (5 cuts) to 25.2 t DM ha⁻¹ year⁻¹ in Marcos Juárez (8 cuts) under rain fed conditions; and 17.3 t DM ha⁻¹ year⁻¹ in Catamarca (Northwestern Region-8 cuts) to 23 t DM ha⁻¹ year⁻¹ in Santiago del Estero (North-Western Region-8 cuts) under irrigation. In bovine production, rotational grazing is still very important in Argentina. Compared to other production systems, grazing alfalfa offers lower production costs and better utilization of alfalfa forage quality; on the other hand, it increases the risk of bloat and requires longer cattle finishing periods. Nonetheless, the use of feed-lot type operations has dramatically increased in the last 15 years. Utilization of corn or sorghum silage and alfalfa hay has become increasingly important for most dairy and beef production systems that use varied degrees of cattle confinement. Despite this, nearly 55% of milk is still produced in grazing-based systems in which alfalfa represents 50% (winter) to 80% (spring and summer) of the total diet.

Hay production - Nearly 850,000 ha of alfalfa were cut for hay and another 150,000 ha were cut for silage (haylage) in 2017. The vast majority of hay -either as small bales (22 kg), round bales (350 to 450 kg) or prismatic big bales (400 or 750 kg)- is used within the farm or sold in the domestic market. In the latter, quality evaluation is based on subjective (color, presence of leaves, smell, etc.) rather than on objective criteria, i.e. crude protein (CP), relative feed value (RFV), fiber (ADF and NDF) content, *in vitro* dry matter digestibility (IVDMD) and/or moisture. Therefore, the overall hay quality in the internal market is low to medium. In addition, buyers usually pay by weight rather than by quality classes. This has resulted in sub-standard practices in hay making (i.e., improper cutting machinery, delayed cutting, inadequate bale storage, etc.) that are quite common. Conversely, and co-existing with the situation described above, the number of farmers and companies aimed at produce high quality hay has significantly increased in the last decade. The country has excellent environmental conditions for growing high quality alfalfa and the capacity to easily increase the planting area within a few years. Updated technology, including sophisticated hay machinery (Figure 1) and better weed and insect control practices, are also available. Practically all hay is sun cured; however, since the rainfall is mostly concentrated from spring to fall, some cuts along the growing season do not reach the necessary quality to meet international standards. In an attempt to solve this problem, there is an increasing interest in establishing dehydration plants for increasing the production of uniform high-quality hay. Although there is at present only one dehydration plant functioning in Argentina, there are other projects on the way for building other plants.

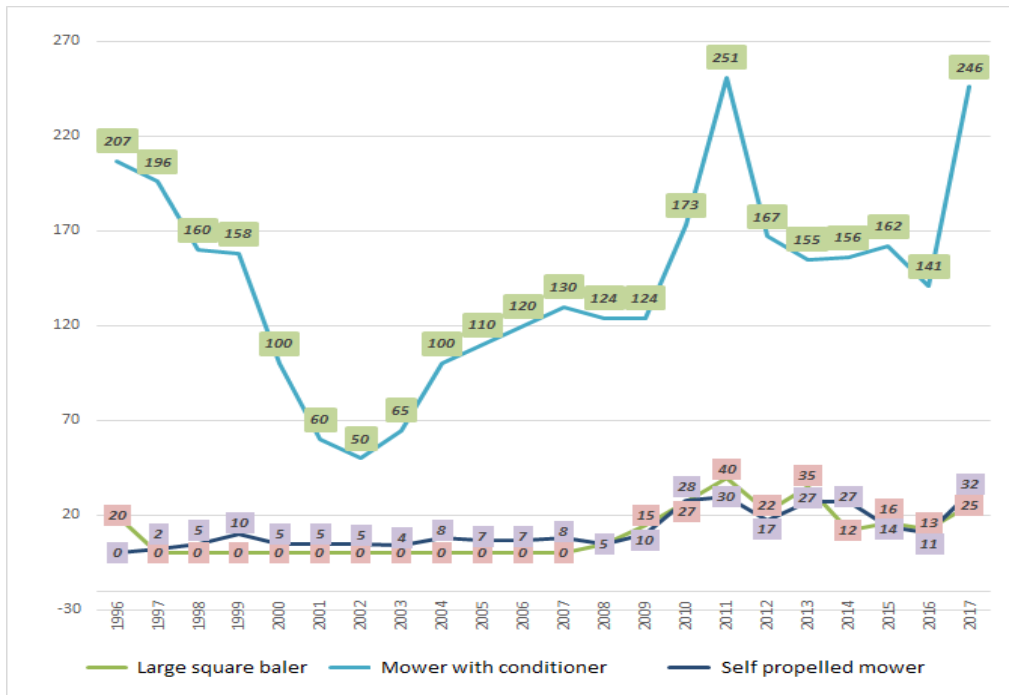


Figure 1. Number of technically-advanced hay machinery sold in Argentina during the last 20 years.

Growing alfalfa for hay can be done under rain fed or irrigated conditions. Within the Pampa Region, production is totally rain fed. On the contrary, in the Northwestern, Cuyo and Patagonia regions, irrigation from either rivers or wells (underground water) is used. The most common system is flood irrigation, but the utilization of pressurized systems (like central pivot) is increasing due to its higher water use efficiency. At present, there are about 60,000 ha under rain fed conditions and approximately 80,000 ha under irrigation devoted to high quality –and so potentially exportable- hay production across the country. However, the potential for significantly increasing those areas in the near future is very high. Overall, on-farm actual average alfalfa yields vary greatly, according to soil and climatic conditions, management practices and moisture availability (rainfall or irrigation). For rain fed operations, production can go from 4-6 t DM ha⁻¹ year⁻¹ under 3-5 cut systems in La Pampa to 18 t DM ha⁻¹ year⁻¹ under 7-8 cut systems in Southeastern Córdoba. Under irrigation, yields can range from 10-12 t DM ha⁻¹ year⁻¹ in 4-5 cut systems in Southern La Pampa to 16-18 t DM ha⁻¹ year⁻¹ in 8-9 cut systems in Santiago del Estero.

Hay exports – During the last decade, alfalfa hay world trade has grown 70% in volume and >95% in value, reflecting the latter the intensity of the demand. In 2017, the global market reached 8.3 million metric tons (ITC, 2018); to this amount, Argentina only contributed 0.7% (54,423 metric tons) (Figure 2). Even though a marginal contributor to the global market, Argentina is gradually improving the average price of its exports since 2014/15, and so considerably diminishing the gap with the main exporters (Figure 3).

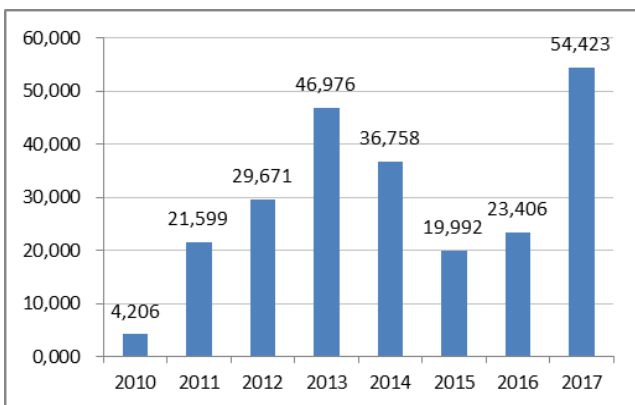


Figure 2. Argentine alfalfa exports (metric tons) in 2010/2017 period (ITC, 2018).

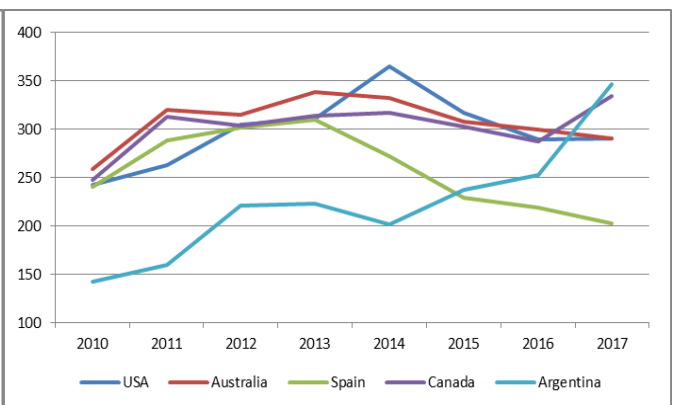


Figure 3. Average international alfalfa hay prices (US\$/ton) in 2010/2017 period (ITC, 2018).

The most important export destinations are by far United Arab Emirates (UAE) and Saudi Arabia (SA), and to a much lesser extent, Jordan (Figure 4). In the last two years, there were some exports to China, a destination that likely will be increasingly important in the near future.

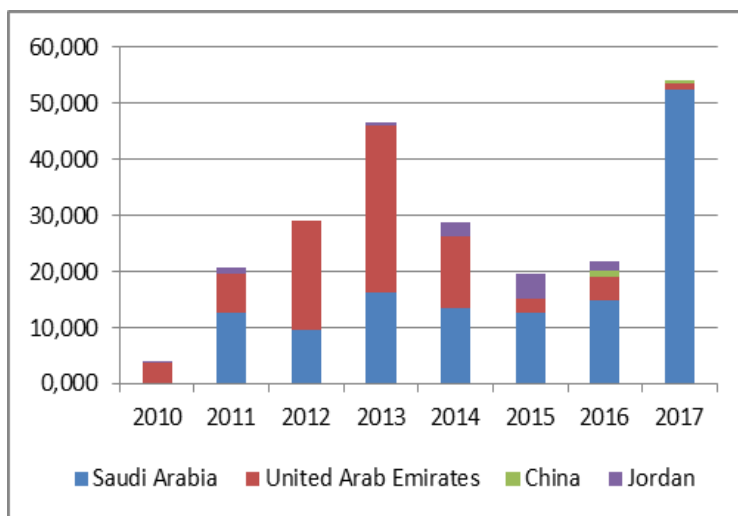


Figure 4. Destinations of Argentine alfalfa hay exports (metric tons) in 2010/2017 period (SENASA, 2018).

From Figure 2 it can be noted that there is a general trend for Argentine hay exports to slowly grow, with the exception of 2015 and 2016, when excessive rains prevented to meet the minimum international quality requirements for most of the cuts. Presently, hay exports in the first trimester of 2018 grew 58% compared to the first trimester in 2017: 28,815 vs. 14,447 metric tons, respectively (SENASA, 2018). In the first semester of 2018, hay exports reached 28,206 metric tons with a mean price of USD 342 per t.

In the case of pellets and alfalfa meal, world exports reached 1.2 million t and a global value of USD 305 million in 2017 (ITC, 2017). Differently from hay, pellets are used primarily for horses, rabbits, chickens, pets, and even pigs. Alfalfa meal is becoming increasingly important for different animal ration preparations and other new uses of alfalfa. Argentina exports pellets to mostly Latin American countries, like Uruguay, Brazil, Chile, Colombia, Venezuela and Panama. In 2017, the exported volume was 4,400 t (Figure 5).

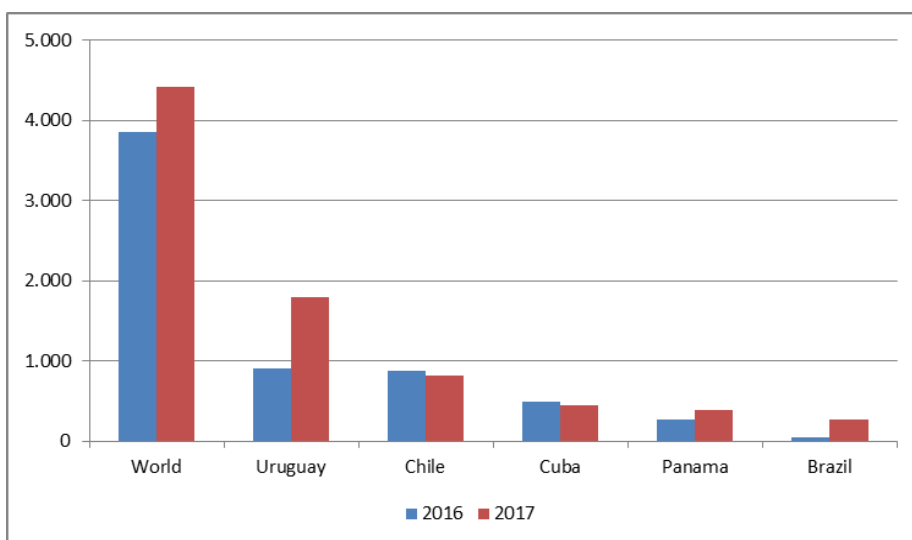


Figure 5. Exports of alfalfa pellets (metric tons) from Argentina in 2016 and 2017 (SENASA, 2017).

A significant event for strengthening Argentine hay production in 2017 was the creation of the *Cámara Argentina de la Alfalfa* (Argentine Alfalfa Chamber) or CAA for its name in Spanish. This is a private institution that nucleates most of the important hay, pellet and cube companies in the country. CAA's main objectives are to promote the crop; to define best management practices for increasing high quality production; to establish a

traceability system and a uniform quality classification for both domestic and international markets; to define a uniform sampling protocol and quality analysis methodology with a qualified lab network; to contribute to solve logistic problems; and to serve as a bridge between hay offer and demand in both international and internal markets.

Another important fact that occurred in Argentina during 2018 was the deregulation of the GE alfalfa containing two stacked events: reduced lignin and Roundup Ready traits. These varieties (HarvXtra™) will be commercialized in Argentina in 2019. Independently of the advantages of this technology, its advent raises the need for defining a series of measures that allows the coexistence of conventional and GE alfalfas in order to satisfy different market requirements. In doing this, it will be critical to prevent the adventitious presence of GE in hay, seeds and/or honey for sensitive markets.

Concluding remarks – Based on a solid demand from Asia and Middle East, Argentina has the opportunity to implement an ambitious strategic plan for organizing the alfalfa value chain. The goal should be to consistently increase the production of high quality hay and other value-added products. International quality standards should also promote the search for higher quality in the domestic market, with the subsequent improvement of Argentine animal production chains. To prevent overproduction in the domestic market, a strategy based on product diversification should be implemented. In doing so, geographical production capabilities, high quality crop management protocols, innovative industrial processes and efficient logistics must be established. The latter is extremely important because logistic deficiencies derive in unnecessary higher costs that impact on Argentine hay export competitiveness. For the domestic market, it is expected a steady increase in meat (beef, pork, sheep and poultry) production; since all of these meat production systems are based on high efficiency and increasing production scale, it is expected that this situation will therefore emphasize alfalfa demand. In addition, milk production is going towards higher scale production models where grazing is being progressively replaced by totally confined systems in which alfalfa hay is provided by specialized third parties from outside the dairy farms. This will also promote the need for higher quality alfalfa feeds.

Bibliography

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