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PRODUCTION CHARACTER OF THE EU HOP INDUSTRY

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Abstract

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Hops are essential for the brewing industry, as they supply considerably to the organoleptic qualities of beer, including taste and flavor. A study of the structure of hop farms in the EU based on an expert questioner's survey and a review of the literature available was carried out in 2009. The hop-producing countries included in the survey were members of the International Hop Growers' Convention (IHGC). The results demonstrate that the production structure in the hop industry sector varies greatly across EU countries. In addition, the structure is changing due to a market-driven structural adjustment aimed at being more competitive. The number of farms growing hops in the main hop-producing countries in the EU declined significantly during the 2000-2008 period. More than an estimated 1,350 farms in the EU-27 stopped growing hops during the period 2001-2007. As a result, the average farm size increased in almost all EU member states. The rate of specialization of hops farms is generally increasing. Briefly, hop farmers are slowly becoming entrepreneurs, and most try to attain a farm size that makes production more profitable.

Key words: hop industry, farming structure, number of holdings, IHGC

Introduction

Hops (*Humulus lupulus* L.) essentially contribute to the quality of the taste of beer and its flavor. Hops are a specialty crop produced for the female flowers (cones), which either raw or processed, are an essential ingredient in the production of beer. Lupulin glands on the hop cones contain soft resins (alpha acids and beta acids), essential oils that impart bitterness, flavor, aroma, foam (head) characteristics, and preservative qualities to beer. The total amount and percentage composition of these compounds vary with variety, region, growing conditions, and production technique (Srecec et al., 2004). Because the brewing industry depends on hops to provide distinctive and proprietary characteristics to beer, a stable supply of high-quality hops is a high priority (Forster, 2001; Pavlovic et al., 2011).

Hop plants in the European Union (EU) are grown on a wire and cable trellis usually suspended about 6 to 7 meters above the ground on a regular arrangement of wooden or concrete poles. Anchors, attached to trellis cables, surround the yard and hold the trellis upright under the weight of the developing crop. Plant spacing depends mostly on

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hop variety and growing area, with 2.4 to 3.2 m between rows and about 1.1 to 1.7 m between plants within rows (Friskovec et al., 2002). Once established, the hop rootstock will produce indefinitely although industry practice is to rotate plantings every 15-20 years. The timing of the rootstock replacement is influenced by declining yield caused by insects, disease and pests (Dolinar et al., 2002) and by merchants', i.e., brewers', demand for specific varieties (Barth and Meier, 2010). The major production practices used annually to produce hops include pruning, stringing, training, irrigating, protecting plant against pests and diseases, harvesting, drying as well as processing and packing according to market demands (Pavlovic, 1997).

The hop industry is one of the highest capital- and work-intensive types of agricultural production. It is estimated that on EU competitive hop farms (more than 10 ha of hops) the initial capital investment required for hop fields with wirework is more than 15000 EUR/ha. Additional investments for specialized mechanization such as spraying and picking machines as well as a hop kiln with all necessary equipment would require at least an additional 25000 EUR/ha. The amount of machine and labor hours varies related to the level of mechanization. The amount ranges between 60 and 80 machine hours and 200 and 350 labor hours per ha. Based on the model SIMAHOP, 39% of the variable costs in hop production involve hop picking and drying, 26% stringing and training of hop bines, 13% plant protection, 12% winter and spring activities in hop fields, etc. with 10 ha of hops and an average yield of 1800 kg/ha (Pavlovic, 2006).

The European Union is the main player in the world hops market. Hops are produced by fourteen EU member states although together Germany and the Czech Republic account for more than 80% of the total EU production by volume. Poland is the only other member state to account for more than 5% of total EU production. Traditional hops production areas can be found within each hop-producing member state, including Bavaria, Saxony, and Bitburg in Germany; Bohemia in the Czech Republic; the Lublin region in eastern Poland; Savinja Valley, Ptuj, and the Koroška region in Slovenia; the Kent and Hereford area in England; the León area in Spain; Alsace in France; the Horna Streda region in Slovakia; the Poperinge area in Belgium, the Velingrad area in Bulgaria, etc (Barth et al., 1994).

Hop growers must respond to the ever-changing needs of the brewing community by providing appropriate varieties at a certain quality demanded by the market as well remain competitive in the global hop industry (Pavlovic and Pavlovic, 2011). An important issue related to competitiveness is the production structure in the hop industry sector (number of holdings, average farm size, and rate of specialization), which will be discussed in this paper.

Methodology

The research was carried out as a part of the Evaluation of the CAP Measures Related to Hops project under the Framework contract No 30-CE-0219319/00-20 for the EU DG-AGRI in 2009. To collate data about the change in the farm structure and organization in the hop industry in EU countries, various methods were used. First, a questionnaire related to farming structure and national organizations in the hop industry was sent to the 11 national representatives of the IHGC member countries (Munisteri et al., 2009). Second, two 2-day field trips to the most important EU hop-producing countries such as Germany and the Czech Republic were organized and carried out by the author to collect additional detailed information. Third, supplementary telephone interviews with 7 EU national hop experts were conducted. In addition, a business report and text from hop merchant companies and hop industry organizations were analyzed (MacKinnon, 2008; Barth and Meier, 2010; Hopsteiner, 2010).

Results and Discussion

The main hop industry statistics worldwide in the period 2001-2008 are collated and demonstrated in the Table 1. In this period, the hop-growing surface area in EU countries varied from 32 569 ha (21 554 ha of aroma hops and 11 015 ha of bitter hops) in 2001 to 29 705 ha (19 756 ha of aroma hops and 9949 ha of bitter hops) in 2008.

In 2008, the total EU hop production was about 57 000 t, more than 50% of the world hops production. The largest producer within the EU is Germany (39 676 t), followed by the Czech Republic (6753 t), Poland (3446 t), Slovenia (2359 t), France (1469 t), the UK (1410 t), etc. Hops acreage is decreasing steadily in the EU, with a 16% reduction since 2001. Bitter varieties are grown in about one-third of the area. This percentage has been constant throughout the last eight years.

Number of hop farms (holdings) in EU

During the 2000-2008 period, the number of holdings growing hops declined significantly in the main hop-producing countries (Table 2). The reduction ranges from 10.9% in Poland to 37.7% in Spain. In Germany, the decrease was 22.9%, with a loss of 446 farms.

While the number of holdings has decreased, the average acreage per holding has increased in all the listed countries from +2.5% in the Czech Republic to +31.6% in Germany. These data series show a large variability in average acreage across member states. The largest holdings are in the Czech Republic (40.7 ha per holding in 2008), and the smallest are in Spain and Poland (around 2 ha per holding).

In the period 2004-2007, according to the data available for all member states, more than 480 farms abandoned hop production. Comparable data for the period 2001-2007 were not at hand. However, if we keep the number of farms abandoning hops growing in the new member states (which make a conservative estimate) constant, we estimate that more than 1 350 farms in Europe stopped producing hops in the period 2001-2007.

Growers mostly exit the hop sector as their farms and hop gardens are not able to guarantee a sufficient income. This phenomenon is affect-

Table 1
Development of surface and yields of hops worldwide

		2001	2002	2003	2004	2005	2006	2007	2008
Acreage (aroma varieties)	ha	28 069	27	25 595	25 903	25 879	25 862	25 583	27 105
Acreage (bitter varieties)	ha	27 46	25 725	25 064	24 197	22 565	20 212	23 94	26 759
Total acreage	ha	57 967	55 348	52 203	51 408	48 995	46 095	49 523	53 865
% bitter varieties	%	47.4	46.5	48.0	47.1	46.1	43.8	48.3	49.7
Acreage (new)	Ha	2 438	2 623	1 544	1 362	586	844	1 551	5 42
Yield (aroma varieties)	kg/ha	1 361	1 448	1 233	1 486	1 636	1 338	1 559	1 706
Yield (bitter varieties)	kg/ha	2 203	2 911	2 116	2 238	2 265	1 846	2 171	2 426
Yield (all varieties)	kg/ha	1 703	2 059	1 812	1 802	1 907	1 766	1 815	2 063
Yield of alpha-acids	kg/ha	149	155	135	164	167	151	165	194
% alpha-acids	%	8.8	7.5	7.4	9.1	8.7	8.5	9.1	9.4
Production (aroma varieties)	tons	38 212	39 09	31 566	38 504	42 336	34 594	39 893	46 228
Production (bitter varieties)	tons	60 494	74 892	53 024	54 16	51 106	37 306	51 974	64 912
Total production	tons	98 705	113 983	94 59	92 655	93 445	81 401	89 866	111 14
Production of alpha-acids	tons	8 639	8 596	7 023	8 452	8 158	6 956	8 161	10 468

Table 2
Number of hop farms and average acreage per farm in major hop-producing countries (2002-2008)

Country	Indicators	2002	2003	2004	2005	2006	2007	2008	2000/08 Change (%)
Germany	Nr. of farms	1943	1710	1698	1611	1554	1510	1497	-22.9
	ha/farm	9.5	9.7	10.3	10.7	11.1	11.7	12.5	+31.6
Czech Rep.	Nr. of farms	185	165	162	145	145	139	131	-29.2
	ha/farm	40.0	36.0	36.0	39.0	37.0	39.0	41.0	+2.5
Poland	Nr. of farms	1191	1129	1121	1144	1113	1066	1061	-10.9
	ha/farm	1.9	1.9	2.0	2.0	2.0	2.0	2.1	+10.5
Slovenia	Nr. of farms	189	186	176	176	150	140	140	-25.9
	ha/farm	9.6	8.9	8.8	8.8	10.1	11.0	11.0	+14.6
UK-England	Nr. of farms	85	76	60	60	60	60	58	-31.8
	ha/farm	21.4	19.0	22.6	17.9	17.4	17.7	18.5	-13.6
France	Nr. of farms	111	100	96	96	96	90	89	-19.8
	ha/farm	7.4	8.2	8.2	8.4	8.3	8.8	9.3	+25.7
Spain	Nr. of farms	398	400	395	353	325	248	248	-37.7
	ha/farm	1.7	1.7	1.7	1.9	1.9	2.0	2.0	+17.7
Belgium	Nr. of farms	52	49	47	45	44	42	29	-44.2
	ha/farm	4.8	4.7	4.4	4.6	4.5	4.4	5-Aug	+20.7
Portugal	Nr. of farms	14	12	12	12	7	4	4	-71.4
	ha/farm	2.6	3.1	3.1	3.3	2.6	5.3	5.0	+89.2
Austria	Nr. of farms	72	73	70	70	67	65	63	-12.5
	ha/farm	3.1	3.0	3.0	3.0	3.0	3.1	3.3	+9.6
USA	Nr. of farms	60	60	52	52	56	62	74	NA
	ha/farm	196.3	188.6	216.0	227.3	212.7	201.7	267.0	NA

ing old farmers, whose farms are not continued by younger generations, and farmers who have small farms. Land abandonment is thought to occur rarely, but no figure exists for hops. Farmers who stop growing hops normally sell their hop gardens to other hop growers, who continue to grow hops.

Average size of hop farms

The average hop acreage per farm increased in almost all the member states because several farmers stopped growing hops. The farmers mostly stopped because of ageing rather than for economic reasons, according to the interviewees. However, the economic component might be stronger than what the interviewees suggested. Related to measures of the EU Common Agricultural Policy (CAP) in the hop sector 2004-2008, some growers of the countries adopting full decoupling may wait to leave the hops sector until they face the next heavy investment (for instance, when renewing hop gardens) and exit at this point, keeping the decoupled support. No figures are available at the national level on the causes of the cessation of hops production, so the estimates are based on personal assumptions made by the interviewees. The hops gardens were mainly sold to other farmers who stayed in business.

Interviewees have confirmed that the increase in average farm size and increase in specialization trend existed before the CAP reform (before 2004); the stakeholders visited link this restructuring to market pressure (mainly to more competi-

tion and to the cost structure of hop farming, which can be extremely onerous) rather than to the CAP reform. Hop farmers are slowly becoming entrepreneurs; thus, most try to attain a farm size that makes production more profitable. The main concern of farmers, according to data gathered in the interviews, is to be able to spread the high fixed costs generated by hop growing over a sufficient number of hectares, so that the farmers can make profits per hectare. When this is not possible, hop growers are slowly stopping hop production, according to the interviewees. Spain, for instance, is an emblematic case in this sense.

Most Spanish and Polish hop holdings are extremely small (< 2 ha) so farmers do not find it convenient to invest in machinery and in new technology. In the long term, farmers either will abandon hop growing or will expand their business to become specialized. The size threshold that makes a farm profitable varies across countries. In Germany, a holding having 10 ha of hops starts being economically viable (once one considers subsidies). A similar size is estimated for Slovenia.

European hop farms (holdings) are becoming larger stepwise. The farm structure varies greatly across the EU countries. The main reason lies in economic competitiveness at the international level. No effect of the CAP reform after 2004 on a farming structure was discovered. The difference in the average size of European farms depends on historical and agronomic reasons. In the Czech Republic, the current farms are the heritage of the enormous socialist collective farms; thus, Czech farms are much bigger than the European average. On the other hand, hop farms in Poland and Slovenia used to be much smaller and predominantly in the hands of independent farmers during the socialist period. In Slovenia, the hop farms on average were significantly enlarged after structural changes when the company "Hmezad kmetijstvo" collapsed in 1999, from 3.5 ha to 10 ha per farm on average. Consequently, about 1000 ha of hop fields were part of local cooperatives and purchased by approximately 70 local hop farmers in the Savinja Valley (Pavlovic and Storman, 2005). On the other hand, in Western European countries hops were traditionally only one of the products grown by mixed farms.

The Tables 3 and 4 present in more detail the information synthesized. They provide a distribution in terms of class size for hop farms in 2003 and 2007. In this section, quantitative data for the countries - for which these data exist and the time series are complete - are provided.

Therefore, the average hop acreage per farm in Europe is increasing but is still much lower than in the USA. This may affect the competitiveness of European hops in the medium term.

The productive structure of U.S. farms is more competitive than European farms. For an idea of the competitive advantage enjoyed by the United States in terms of production structure, the 12 510 ha devoted to hops in 2007 in the US were spread over 62 farms. This works out to 202 ha per farm, 18 times the average German farm and more than five times the average Czech farm.

Rate of specialization of hops farms

The rate of specialization of EU hop farms is generally increasing. The interview results showed that hop farms tend to become more specialized in Germany and Czech Republic. In Germany, the specialization rate (defined as the amount of revenues determined from hops of the overall farm revenues) for hop-producing farms increased from 42% in 2003 to 59% in 2006. A similar trend can be observed in the Czech Republic, with the specialization rate increasing from 16% in 2004 (the first year for which data were available) to 25% in 2006. As these data come from the FADN (Farm Accountancy Data Network) database, they are limited to these two countries.

Other EU countries had no hop sector FADN data available. However, a number of interviewees

Table 3
Hop farm structure by class size in 2003

	< 2 ha	2<ha<5	5<ha<10	10<ha<20	20<ha<30	30<ha<50	50<ha<100	>100 ha	TOTAL
Belgium	0.0%	0.0%	0.0%	25.0%	25.0%	50.0%	0.0%	0.0%	100%
Czech R.	0.0%	0.0%	0.0%	6.3%	12.5%	6.3%	12.5%	62.5%	100%
Germany	0.0%	3.3%	11.5%	31.7%	20.8%	23.0%	7.1%	2.7%	100%
Spain	31.6%	57.9%	10.5%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
France	0.0%	0.0%	16.7%	16.7%	8.3%	25.0%	25.0%	8.3%	100%
Austria	0.0%	0.0%	11.1%	33.3%	33.3%	22.2%	0.0%	0.0%	100%
Poland	8.7%	26.1%	41.7%	17.4%	2.6%	1.7%	0.9%	0.9%	100%
Slovenia	6.3%	6.3%	25.0%	25.0%	25.0%	12.5%	0.0%	0.0%	100%
UK	0.0%	0.0%	0.0%	6.3%	6.3%	12.5%	25.0%	50.0%	100%

Table 4
Hop farm structure by class size in 2007

	< 2 ha	2<ha<5	5<ha<10	10<ha<20	20<ha<30	30<ha<50	50<ha<100	>100 ha	TOTAL
Belgium	0.0%	0.0%	0.0%	25.0%	25.0%	50.0%	0.0%	0.0%	100%
Czech R.	0.0%	0.0%	0.0%	7.7%	0.0%	7.7%	15.4%	69.2%	100%
Germany	0.0%	3.2%	10.9%	28.2%	19.9%	23.1%	12.2%	2.6%	100%
Spain	30.8%	53.8%	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
France	0.0%	0.0%	0.0%	16.7%	8.3%	50.0%	25.0%	0.0%	100%
Austria	0.0%	0.0%	50.0%	25.0%	0.0%	25.0%	0.0%	0.0%	100%
Slovenia	0.0%	10.0%	20.0%	20.0%	30.0%	20.0%	0.0%	0.0%	100%

in other member states have confirmed this trend. Interviewees also linked the increased level of specialization to the high revenues that hops provide if cultivated on an adequate scale.

Conclusions

The EU hop industry sector, similar to the global hop trade and the world brewing industry, is facing a trend toward a concentration in capital investment and decision-making. The following main findings related to the hop industry farming structure can be stated:

The production structure in the EU-27 is changing, which is mostly due to market-driven structural adjustment aimed at being more competitive. Growers are exiting the hop sector as their farms and hop gardens are not able to guarantee a sufficient income. No evidence regarding the influence of the CAP reform after 2004 on the production structure was discovered.

The average hop farm size is increasing in all EU member states. The growth in the average size is mainly due to the reduction in the number of growers, while the reduction in hop area is less pronounced. Small hop-producing countries with weak or no sector-linked national research and development support have seen a sharper decrease in growing area and in the number of farmers. In some countries, such as Spain, Belgium, Bulgaria, Portugal, and the UK, the reduction in the number of growers has endangered the very existence of the hops sector. The few farms left are becoming more specialized in hops in terms of equipment and other investments. However, the farms are still much smaller than in the US, and this could affect the competitiveness of European hops in the medium term.

With the exception of Germany, hop acreage in Europe is dwindling, following the global trend. This is mainly due to the launch of new bitter hop varieties by the USA and Germany that provide a higher yield per hectare so that less acreage is needed for the same amount of alpha acids, required by the global brewing industry. However, the acreage reduction was insufficient to prevent an oversupply of hops in 2009 and 2010. Again, farmers' on-time business decisions linked to making forward contracts for their crop production play a crucial role in the farmers' hop supply competitiveness at the end of the decade investigated.

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