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Market of grain legumes in the UK

Results of the EU-project LegValue

Bruno Kezeya Sepngang

Roger Vickers

Frédéric Muel

Tiana Smadja

Marcus Mergenthaler

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Forschungsschwerpunkt:
Agrarökonomie

Fachhochschule Südwestfalen
Standort Soest
Fachbereich Agrarwirtschaft
Lübecker Ring 2
59494 Soest

Tel.: 02921 / 378-3283
Fax: 02921 / 378-3200

E-Mail: agrar@fh-swf.de
www.fh-swf.de/FB/agrar

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Abbreviations

APHA : Animal and Plant Health Agency

BEPA : British Edible Pulses Association (now known as Pulses UK)

BGA : British Growers Association

BSPB : British Society of Plant Breeders

CAP : Common Agricultural policy

DEFRA : Department for Environment Food & Rural Affairs

EU : European Union

NIAB : National Institute of Agricultural Botany

PGRO : Processors and Growers Research Organisation

1 Introduction

Legumes play an important role in animal and human nutrition. Depending on the crops, some of them are mainly used for feed or food. In addition, their cultivation has many benefits in crop rotation (GUINET ET AL., 2019) and preserves biodiversity (RECKLING ET AL., 2016). However, they remain as niche in comparison to cereals (EUROSTAT, 2019).

In the UK some specific aspects about legume production and marketing have to be considered. Faba bean is the most produced grain legume in the UK (EUROSTAT, 2019). Their production could reach more than 700,000 t in some years. Hereby, the UK is the first producer of faba beans in Europe. While the main use of faba beans in the UK is for feed, their exportations are principally dedicated for the human consumption. The second important grain legume in the UK is field peas, with the main use for food.

This report is part of the transdisciplinary EU research project "LegValue". Work package 3, which deals with the market and economics of legumes, has as an important objective to increase the market transparency of legumes. The present study describes the markets of the main growth legumes and shows price information systems for grain legumes in the UK. A mixed-method approach based on quantitative and qualitative analyses was used in this study. The parameters that were used for the quantitative analyses are production, domestic consumption, imports, exports and wholesale prices.

2 Data sources and methods

Four legumes species are analysed in this report: Faba beans (also known as broad and field beans, lat. *Vicia faba),* field peas (harvested dried, lat. *Pisum sativum)*, fresh peas (lat. *Pisum sativum)* and fresh beans (lat. *Phaseolus* vulgaris). These crops are selected based on their higher total production in the UK. A mixed methodological investigation was undertaken in this study. Several data bases (Eurostat and UKtradeinfo) and national website like Farmers weekly Magazine, Animal and Plant Health Agency (APHA), British Edible Pulses Association (BEPA) now known as Pulses UK, British Growers Association (BGA), British Society of Plant Breeders (BSPB), Department for Environment Food & Rural Affairs (DEFRA), National Institute of Agricultural Botany (NIAB) and Processors and Growers Research Organisation (PGRO) were explored and used for a basic quantitative and qualitative description of the UK grain legume market. The investigated period was from 2013 to 2018, whereby the quantitative data for 2018 are preliminary. The analysed data refers to the calendar years and not to the crop years. Furthermore phone interviews with two representatives of „Pulse UK“ were undertaken in December 2018. Based on their expertise in the grain legume market, their statements and estimations have been incorporated qualitatively in this report.

The analysed parameters are the production from Eurostat; the import and export from HMRC and the national consumption which was calculated based on the production, imports and exports. Due to the lack of information, the stock variation is not considered in this work. The repartition of the national consumption (food, feed and seed) was estimated based on expert´s statements and calculations. These estimations were cumulated as average for the last recent years and transfer to the model develop by the French project named “COSELAG” (2016 to 2018).

3 Results and discussion

This chapter describes the recent supply balances of grain legumes and identified their different market in the UK. The main used parameters are production, import, export and national consumption. Experts stated that a very small amount of grain legumes is imported into the UK and it does change from year to year. The foreign trade data from the statistics are totally different from those for the expert´s estimations. One reason is the very small amount of the foreign trade quantity. Another reason is the intra trade of pulses within the EU. For the export, for example, they transported by truck rather than by containers or in bulk transportation, so there is no requirement to record the amount of grain because it remains in the EU.

3.1 Description of legume market heterogeneity

3.1.1 Faba beans

Faba beans, also known as fava beans, are the most produced grain legume in the UK. They have been grown in the UK for many hundreds of years. Originating in the fertile crescent of the Middle East, they are traceable in Britain from the Iron Age. By the Middle Ages they were a staple part of the diet of the common population, a cheap nutritious food that had the benefit of being storable for use all year round. Bean consumption decreased as the population became more prosperous but production continued and large quantities were fed to horses (hence the colloquial name Horse Beans) before the advent of the internal combustion engine. They fell out of favour in the UK losing their place to peas for many decades not retaking their first position until the mid-1980's and they have remained the dominant pulse in the UK ever since. Today the main markets for faba beans are processed animal feed and in food for export to the Middle East and North Africa where they are used for a staple element of the populations' diet. Faba beans thrive in a cool moist climate with fertile soils and are ideally suited to the temperate conditions that a predominant in the UK.

Until now, the UK remains the largest producer of faba bean in Europe. Figure 1 presents the supply balance of faba beans in the UK from 2013 to 2018, whereby the data for the year 2018 are not yet stabilized. **Faba beans are principally used for feed in the UK**. Hereby, Faba beans are also used in **aquaculture**. Differently to the use in the UK, the **exported faba beans are used in the human consumption.** It is stated that the use for food in the UK is so small that it is likely to be not worth guessing, certainly less than 1000 tonnes. The actual uses for feed and food are not quantified. An estimation of this share for food and feed can be found in figure 5 in chapter 3.2.

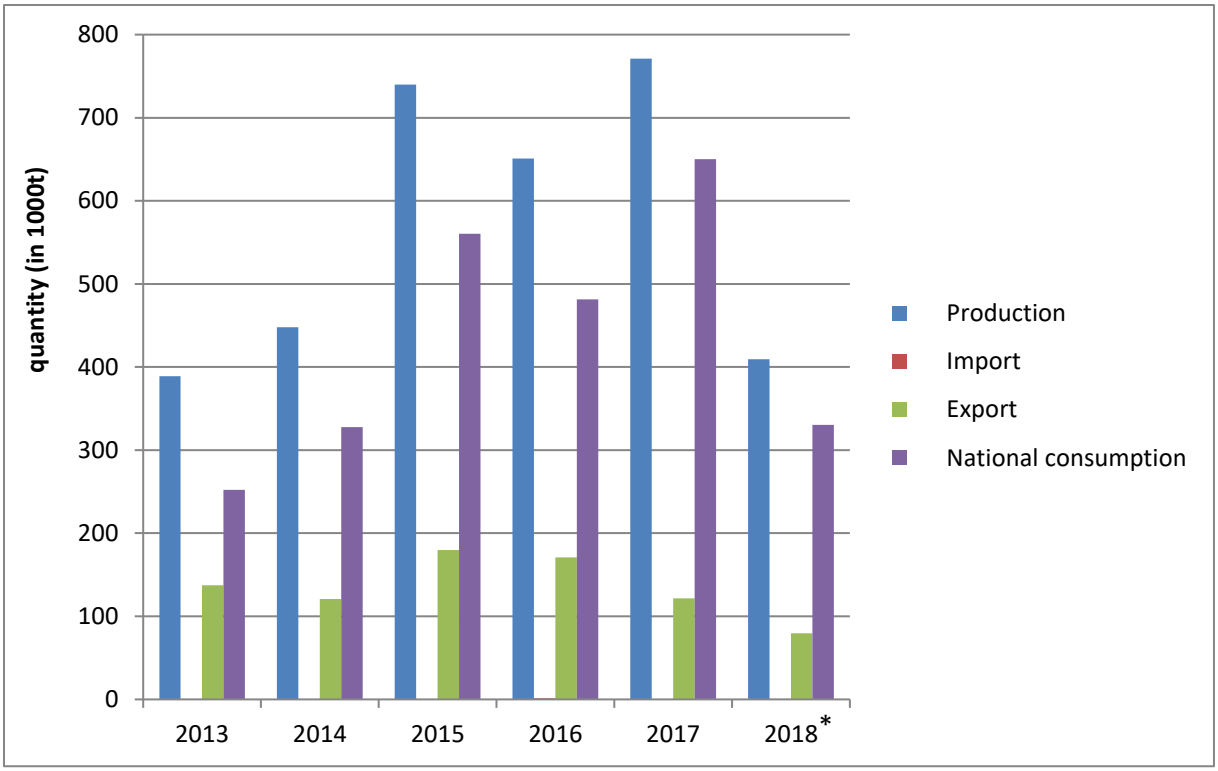

Figure 1: Supply balance of faba beans in the UK from 2013 to 2018. Primary sources: Eurostat and Uktradeinfo (Filtered on "07135000 - Dried, shelled broad beans "Vicia faba var. major" and horse beans "Vicia faba var. equina and Vicia faba var. minor", whether or not skinned or split" only). *: preliminary.

The production of faba beans varies from year to year and its evolution over the years presents an arc of circle. The exponential increase from 2014 to 2015 is due to the new greening measures of the common agricultural policy (CAP) that started its implementation in 2015. Prior to the introduction of the three-crop rule, in the UK many farms had only two crops in the rotation (e.g. wheat-rapeseed). These short sequence cropping practices have led to significant agronomic cropping problems and with increasingly restrictive regulations on the use of agrochemicals a clear need to adopt different production techniques to ensure more sustainable cropping. The introduction of the “three crop-rule” in the UK in 2015 led to the increase of the cultivated area of legume and as consequence to an increase in the production. Every farmer who has more than 30 ha has to grow at least 3 crops on his farms. Furthermore, the better remuneration of pulses in the premium market for human consumption is a motivation for farmers to grow them.

The average yield of faba beans in 2016 was 37 dt/ha compared to 43.5 dt/ha in the year before (Eurostat, 2018). This directly explains the decrease in production from 2015 to 2016. This is probably due to the continued wet and cool summer 2016 that negatively affected the yield of faba beans in this year. The recent decrease in the production from 2017 to 2018 is primarily due to the decrease in the cultivated areas in this period (193,000 ha in 2017 to 158,000 ha in 2018) (Eurostat, January-2019). The decrease in cultivated area is caused by disappointing commodity values combined with a reversal of the EU CAP regulations on Ecological Focus Areas (EFA’s). The imposition of a restriction that prevented the use of any agrochemical inputs on areas designated as an EFA mean that growers who had previously used beans or peas to qualify were disincentivised from growing the crops, despite their environmentally beneficial characteristics. Secondly, the severe drought of the summer of 2018, which

contributed to the reduction of yields, namely from 40 dt/ha in 2017 to 32 dt/ha in 2018 (Eurostat, January-2019), impacted yield production in 2018.

Of note is that the proportion of cultivated areas with spring varieties are decreased from around 80 % of the total cultivated areas for faba beans in 2015 to around 60 % in 2017 (calculated based on DEFRA, 2018 and Eurostat, 2018). On the other hand, the proportion of the cultivated winter varieties is increasing. The more valuable market for beans is in export for human consumption and in general, spring beans produce a visually more appealing sample than winter varieties. The skin colour tends to be paler and in some areas, they are less prone to bruchid beetle damage. Spring sowing provides specific weed and disease control opportunities and can spread the workload more manageably across the calendar. The advantage of winter beans is a slightly earlier harvest and the perception of slightly higher yield. In addition, spring sowing in many areas is hampered by wet soils and any prolonged winter weather, making the opportunity to sown into good soil conditions in a mild autumn, a very attractive proposition.

The view of expert opinion is that **imports** to the UK are minimal. Small quantities showing up in the trade figures are highly likely to be parcels making good short trade positions or transitory loads to onward destinations.

The **exports** vary annually. Based on the data from figure 1, the mean value of the exports from 2013 to 2018 represents ~21 % of the mean value of the production in the same period. An increase is observed from 2014 to 2015 following a strong increase in production in 2015 when new greening measures of the common agricultural policy (CAP) were implemented. Experts estimate that exports in 2018 were small, approximately 200,000 tonnes. In the past exports have reached almost 300,000 tonnes, mostly to destinations outside the EU. Although in 2017 there was a lot shipped to Spain and Italy too.

Production in other export countries also affects the exports of these legumes from the UK. In 2016 the Australian production almost doubled and they dominated the market in Egypt due to availability and perceived quality benefits. HMRC 2019 figures show that outside the EU, the largest markets for UK´s faba beans have been Egypt (145,000t in 2016 and 72 000t in 2017) and Sudan (16 000 t in 2016 and 27 000 t in 2017). The main use in these countries is for food so the quality requirement for exports to these regions is high. For this market, minimal bruchid damage is required.

Exports for feed depend upon relative values of other protein sources. For several years there have been almost no feed exports, however in 2017 around 100,000 tonnes were shipped mainly to northern Mediterranean destinations.

Aquaculture is a rapidly expanding section of agriculture and in Europe, Norway is the most significant producer. De-hulled faba beans are in demand as a protein source and feed formulation ingredient in this market. In 2017, 18,000 t of UK´s faba beans were exported to Norway. Only 1,000 t had been exported to this country the year before.

3.1.2 Field peas

Field pea is the second most produced grain legume in the UK. The market is dominated by green/blue grained peas. Figure 2 presents the supply balance of field peas in the UK from 2013 to 2018 (2018 data are not yet stabilized). The main market for UK pea producers is for premium quality human

consumption. Secondary markets exist for produce that does not meet the grade. The second is the premium animal feed market where products are taken for micronizing. This is mostly for the pet food and livestock market. The third is as a lower grade animal feed ingredient. The last of these markets is small and usually trades at a discount to faba beans as a feed. The quantities of peas used in the feed markets is not stated, though an estimation of the share for food and feed can be found in figure 6 in chapter 3.2. AITCHISON (2017) classified combining peas by type and quality criteria. White peas, large blues, small blues Marrowfats and Maple peas are the available types on the market.

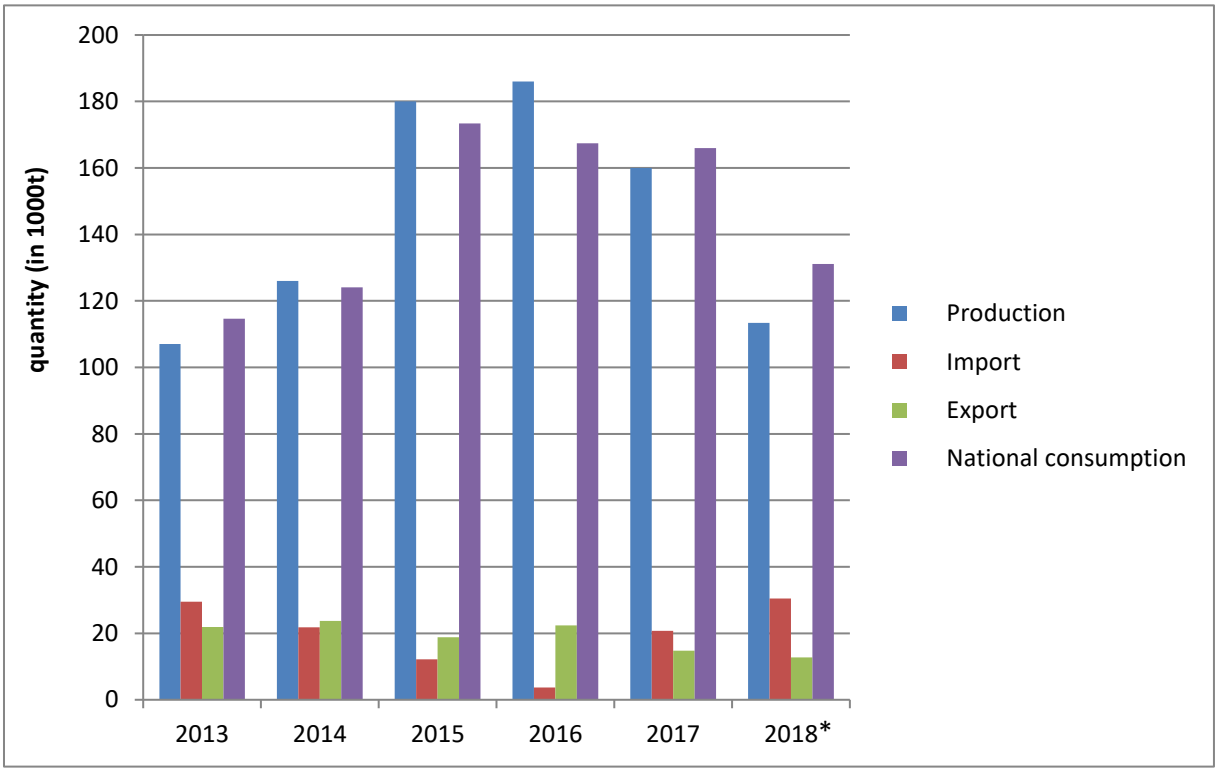

Figure 2: Supply balance of field peas in the UK from 2013 to 2018. Primary sources: Eurostat and Uktradeinfo (Filtered on "07131010 - Peas, "Pisum sativum", dried and shelled, for sowing" and "07131090 - Peas, "Pisum sativum", dried and shelled, whether or not skinned or split (excl. peas for sowing)" only). *: preliminary.

Analogous to the production of faba beans, the production of field peas also varies from year to year and its evolution presents an arc of circle with a leap between the years 2014 and 2015 and a remarkable drop between 2017 and 2018. The possible reasons for this evolution are listed in chapter 3.1.1. The introduction of the new CAP and its restriction regarding the application of agrochemical in EFAs a few years later are the principal raison of this evolution. The area fluctuation of faba beans and field peas are almost identical.

The national consumption is not only influenced by the production, but the imports and exports also play a role in this case. Based on the data from figure 2, the mean value of the exports from 2013 to 2018 represents ~12 % of the mean value of the production in the same period of years. The share of imports is 10.5 % of the production. This also shows that the exports slightly dominate imports, at least in the selected period.

In 2017, more than 75 % of the exports went to Asia and Oceania. China (~5,000 t), Japan (~3,000 t) and Malaysia (~2,000 t) were the main country where the UK´s field peas were exported. In the far East the best quality marrow fat peas are prized for snack consumption. That is a trend that is growing

and is also developing in the European market too. It is not unknown for production to be exported only to return as a processed or coated pea snack. Norway and South Africa, each with around 1,000 t of UK´s field peas exports in 2017, also represent important markets for this product in Western Europe and in Africa. For this purpose, the use is for fish feed in Norway and for human nutrition in Africa.

The main country from where the UK imported field peas in 2017 was Russia with more than 12,000 t. This represents 60 % of the total import in this year. Turkey comes in second place 4,000 t. These imports are likely to have been used animal feed.

In conclusion, good quality is exported and minor quality is imported. This reflects the calculated unit values for export (415.46 £/t to China and 604 £/t to Japan) and the unit values for import (315 £/t from Russia and 304 £/t from the Turkey) in the year 2017 (HMRC, 2017).

3.1.3 Fresh peas

Fresh peas are the third most produced grain legumes in the UK with a production that varies from 120,000 t to 160,000 t in the last five years. Fresh peas (Vining peas) are peas that are grown to an immature state. They are harvested and then very rapidly frozen. Figure 3 describes the supply balance of fresh peas in the UK. Similar to the dry legumes, the evolution of the production shows a rise and fall in the chosen period. The only difference is the rapid increase in production in 2014, not in 2015, as it was the case with faba beans and field peas. Fresh peas are to be treated as any other arable crop for CAP purposes. Curiously, their production are decreasing since the implementation of the new CAP that considered the cultivation of legumes as ecological focus area. Far from the political measures, other factors could explain this decline. Firstly, the changing eating habits consumption declines. Declining vegetable intake across Europe is a common theme (WOLLBOLD AND BEHR, 2019). Secondly, the weather had much influence on the production, too. 2015 was an excellent production year. Subsequently, the weather has had a significant negative influence, especially in the year 2018 that was the worst since 2012.

The calculated national consumption is continuously higher than the production. Experts guess that there is a high per capita consumption of fresh peas in UK, probably higher than to other EU-Countries. To close this gap, fresh peas were imported in the recent years. On average from 2013 to 2017, imports represent 9 % of the fresh pea's production in the UK. In 2017 Latin America (Guatemala: 4,000 t and Peru: 1,600 t) was the principal origin of the UK´s imports, followed by Sub Saharan Africa (Zimbabwe 1,900 t and Kenya: 1,800 t) and Nord Africa (Egypt: 1,300 t). The imports here are probably referring to "Mange tout" and peas in their pods. The bulk of this market is frozen peas and these are not being imported from these Latin American or African origins. The exports are not important in this market. Due to the higher production in 2014 und 2015, a small amount of fresh peas was exported to Asia, Middle East and Nord Africa in 2015.

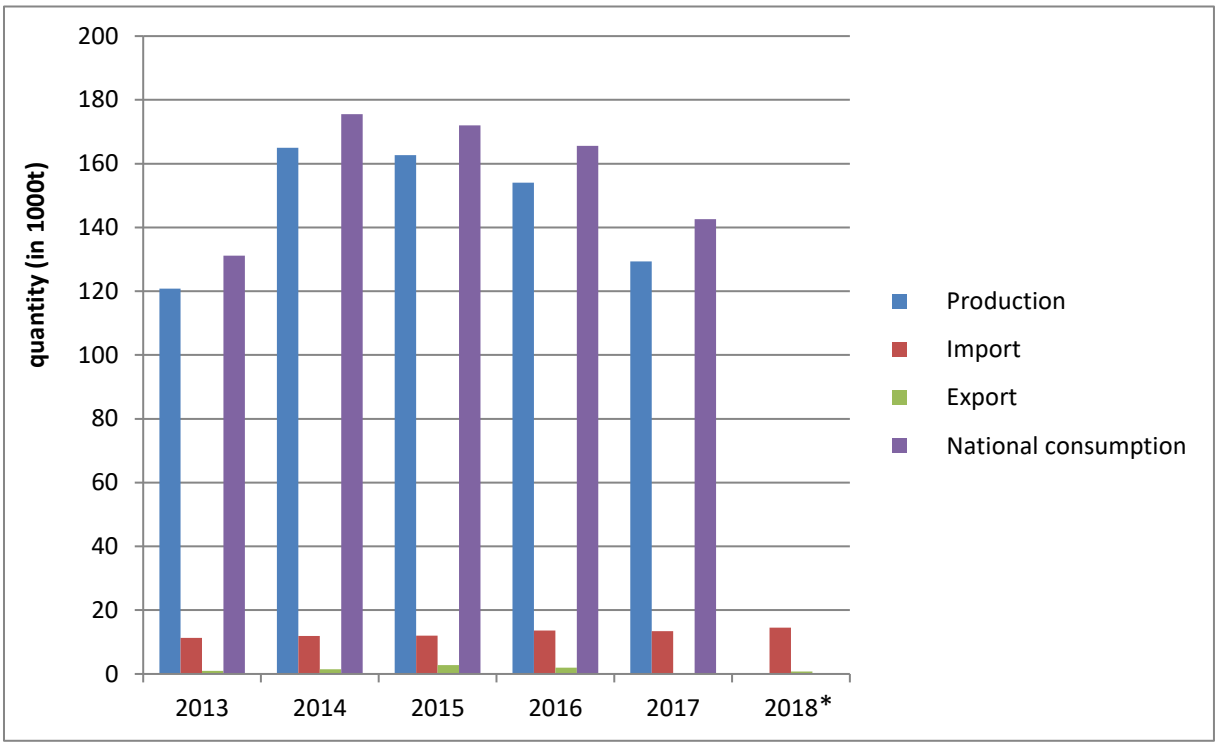

Figure 3: Supply balance of fresh peas in the UK from 2013 to 2017. Primary sources: Eurostat and Uktradeinfo (Filtered on "07081000 - Fresh or chilled peas "Pisum sativum", shelled or unshelled" only). *: preliminary.

Fresh peas are grown for human consumption. As their conservation is very difficult because of their high moisture content, they are frozen or canned for a long conservation period. Frozen peas contribute more than 95 % of the total fresh harvested peas (BGA, 2016). With this score, UK is one of the first frozen peas producer in Europe. France, Belgium, Spain and Italy are also leaders in Europe´s frozen peas. A recent British Frozen Food Federation report referring to increased frozen pea consumption stated: “This is matched by a drop in the popularity of canned and tinned food. The amount of canned peas bought by a typical household dropped from 88g to 14g per week between 1974 and 2014. In total, consumption of canned vegetables dropped by a third over the same period.”

According to BGA, 2 % to 15 % of drilled hectares are lost. Drilled areas lost are generally known as „bypassed“ crops. The biggest reason for loss is a failure in the cropping plan. The crops must be harvested in a very narrow window of maturity. If the maturation of the crops becomes out of sequence with the plan, the ability to harvest all the crops in a time critical-window can be lost. The bypassed crops are either allowed to mature for seed production or are simply destroyed in the field (green manure). This description about the losses is similar in the case of fresh beans.

3.1.4 Fresh beans

Fresh beans are the fourth most produced grain legumes in the UK with a production that varied from 14,000 t to 50,000 t (fresh matter) in the last five years. Figure 4 describes the supply balance of fresh beans in the UK. The evolution of the fresh beans production from 2013 to 2017 shows a negative correlation r= -0.6 with this for fresh peas, r= -0.89 with faba beans and r= -0.92 with field peas. While the production of fresh peas and the other dry grain legumes increased from 2013 to 2015, the production for fresh beans decreased in the same period. It could be assumed that the new CAP has favoured the production of other legumes to the detriment of fresh beans. Or, although fresh beans

are recognised as EFAs, the new CAP had no influence on its production. The high costs of the production compared to the cheap imports could be another reason of this decrease. The popularity as a crop for the consumer is as well a lever here.

The decreasing trend of the production from 2013 to 2015 had a consequence on the national consumption. A possible change in food preference led to unusual exports being made in 2016, which further reduced the domestic consumption. The principal destinations of these exports in 2016 were in Middle East and North Africa (United Arab Emirates: 7,100 t, Egypt: 5,500 t and Morocco: 3,000 t).

The calculated national consumption of fresh beans is continuously higher than the production. To close this gap, fresh beans have been imported in the recent years. Contrary to grain legumes analysed in this report, the quantity of fresh beans imported has been higher than the average production in recent years. From 2013 to 2017, domestic production represented 94 % of imports into the UK. The principal origin of these imports in 2017 was in Africa, with Kenya as the first supplier (18,000 t) followed by Egypt (3,000 t). Guatemala (2,150 t) was also a supplier of fresh beans in the UK in 2017.

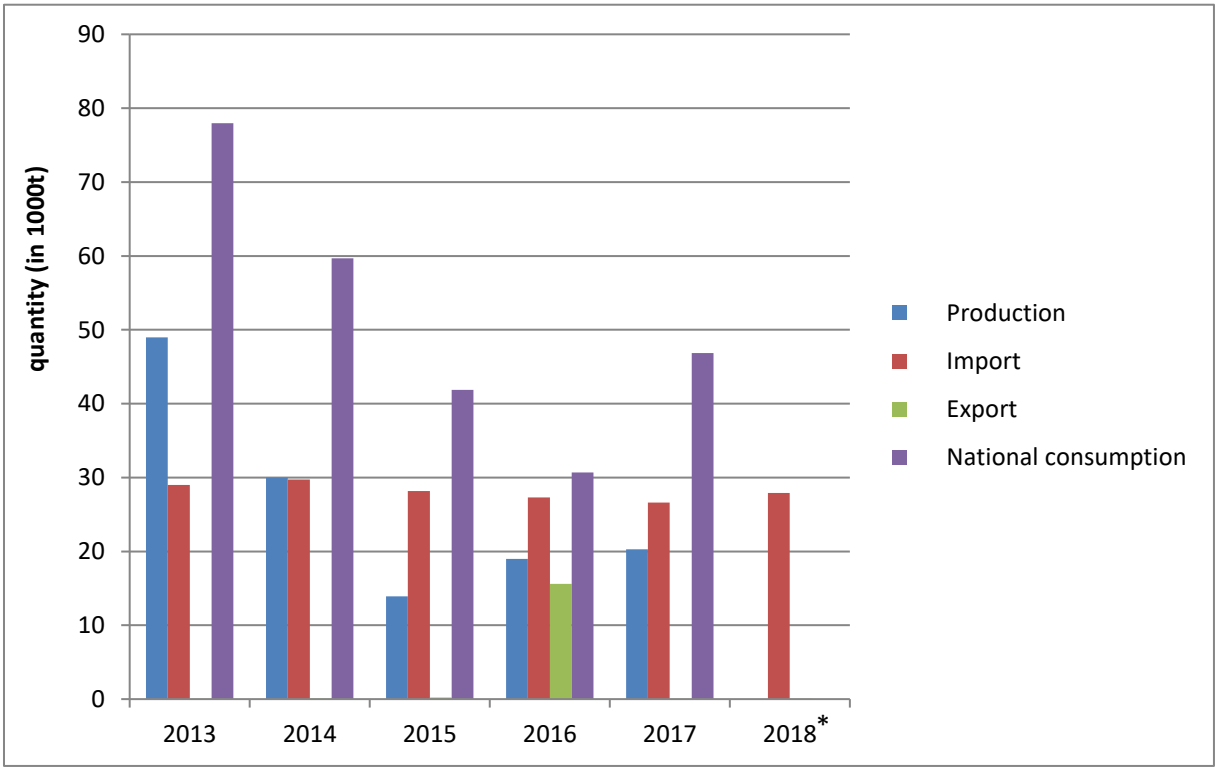

Figure 4: Supply balance of fresh beans in the UK from 2013 to 2017. Primary sources: Eurostat and Uktradeinfo (Filtered on "07082000 - Fresh or chilled beans "Vigna spp., Phaseolus spp.", shelled or unshelled" only). *: preliminary.

Similar to fresh peas, fresh beans are grown for human consumption. There is a small production of green beans in the UK. They are harvested fresh for directly retailing but also for freezing. The losses are similar to those of fresh peas (see chapter 3.1.3).

3.2 Flow of goods for faba beans and field peas

This section provides an overview of the recent main markets of faba beans and field peas in the UK. Figures 5 and 6 outline the flow of good for faba beans and field peas from the seed production to end use in the UK. Quantifications should be considered as estimations, since they are result of the mean values from 2015 to 2017 and include estimations of experts. It is important to note that there are several factors that influence these estimations, including political decisions (e.g. the new CAP, the international trade conflict between USA and China, and the Brexit discussions ...) and climatic factors.

There are 103 official seed multipliers but only 32 actually declared pea and bean production in 2018. However significant farm saving of seed takes place in the UK particularly with pulse crops. It is assumed that the UK market for faba bean seed is dominated by farm-saved seed so any statistics for certified seed will be hugely underestimating the actual seed use. According to APHA (2018), over 800 companies are licensed to sell seeds in the UK. 199 of them are licenced for packing, sealing and labelling and 118 of them are licenced to clean, treat and process seeds.

The faba bean seeds used in the UK are produced domestically with little international trade in this segment. Seed production figures from the BSPB (British Society of Plant Breeders) declared 13,064 t of farm-saved seeds in 2017. Statistics from the NIAB show for the same year 16,900 t certified faba bean seeds (see figure 5). Similarly, field pea seeds are mainly produced in the UK, and only a very few are imported (see figure 6).

In 2017, BSPS declared 1,500 t of farm-saved seed and NIAB, around 6,000 t certified seeds. These statistics suggest that there is a lot of scope for evasion of farm-saved seed declaration. For the crop year 2018/2019 all areas sown with farm-saved seeds not processed by BSPB registered cleaners, a rate of 10.10 £/ha for peas and 13.42 £/ha for beans is applied to the farmers.

For the year 2019, poor seed availability due to the dried summer in 2018 will have a negative impact on the total cultivated areas for both peas and beans.

It is uncertain how many collectors of grain legumes exactly are active in the market place. The association “Pulses UK” (Previous known as BEPA) encounter around 36 merchants and processors that are membership. They vary enormously in size and whether they are all classified as collectors is a different matter. Some of them are small merchants who trade but do not actually see any product pass through their premises. They are effectively a kind of broker. These numbers should be considered as estimation for the UK because there are some traders not represented on that platform.

Categorisation in food and feed is very difficult because of annual variation due to weather conditions and the quality of produce harvested. Difficulties have increasingly been found in the human consumption export market due to reduced control of Bruchid beetle. The Bruchid beetle causes physical damage to the seed making it unsightly and undesirable. Higher temperatures, increased beetle activity, reduced availability of agrochemicals and suggesting of pest resistance have made attaining the premium for this market more problematic in recent years.

The same trends are not seen by field peas. Most peas are processed for human consumption. A very small percentage of poor quality goes directly to compound feed. Experts assume that 80 to 90 % of the total resources are used for food.

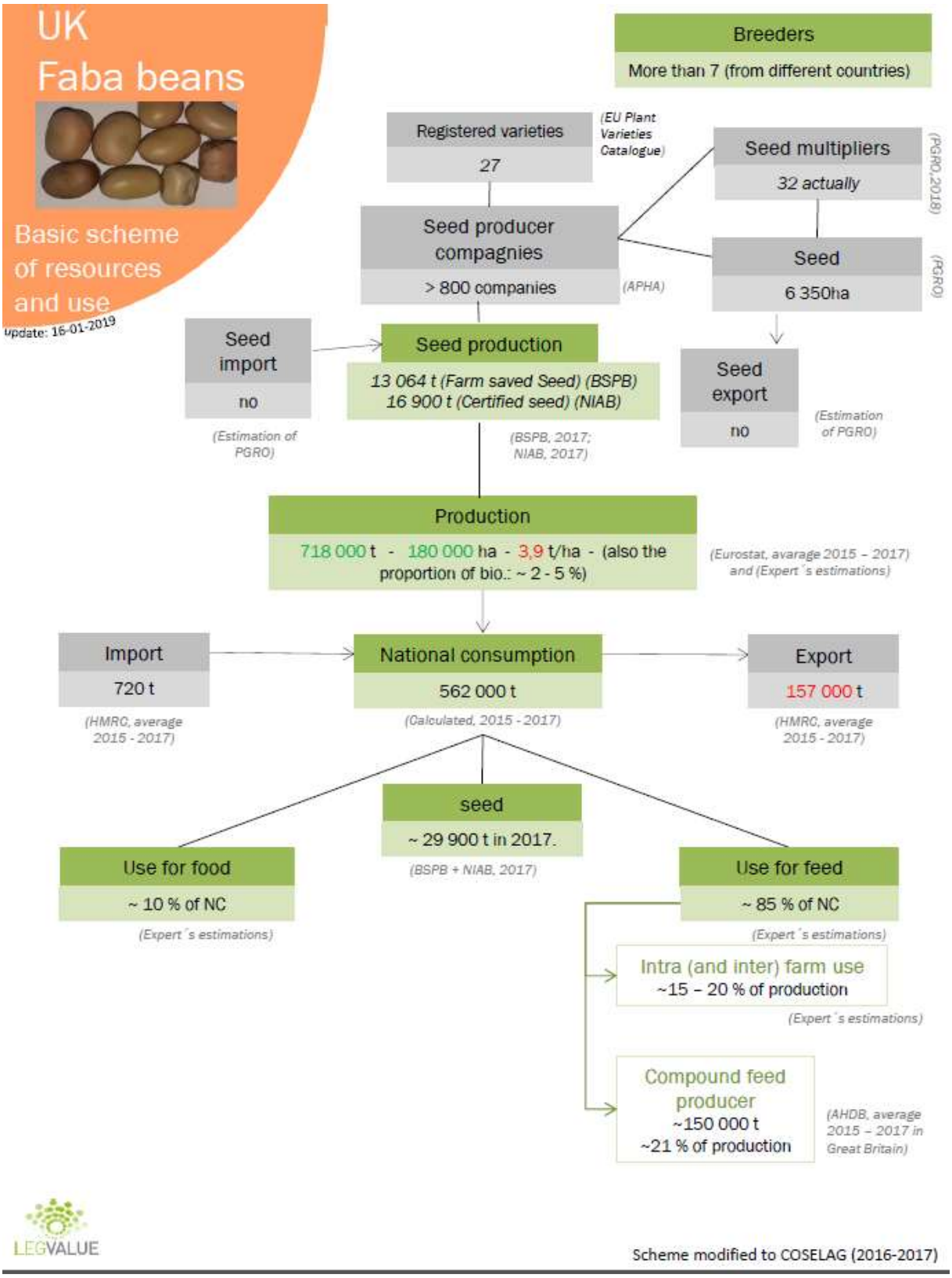

Figure 5: Detailed flow of good for faba beans from the seed production until the end use in the UK. The numbers written in green indicate an increasing trend and the red ones indicate a decreasing trend.

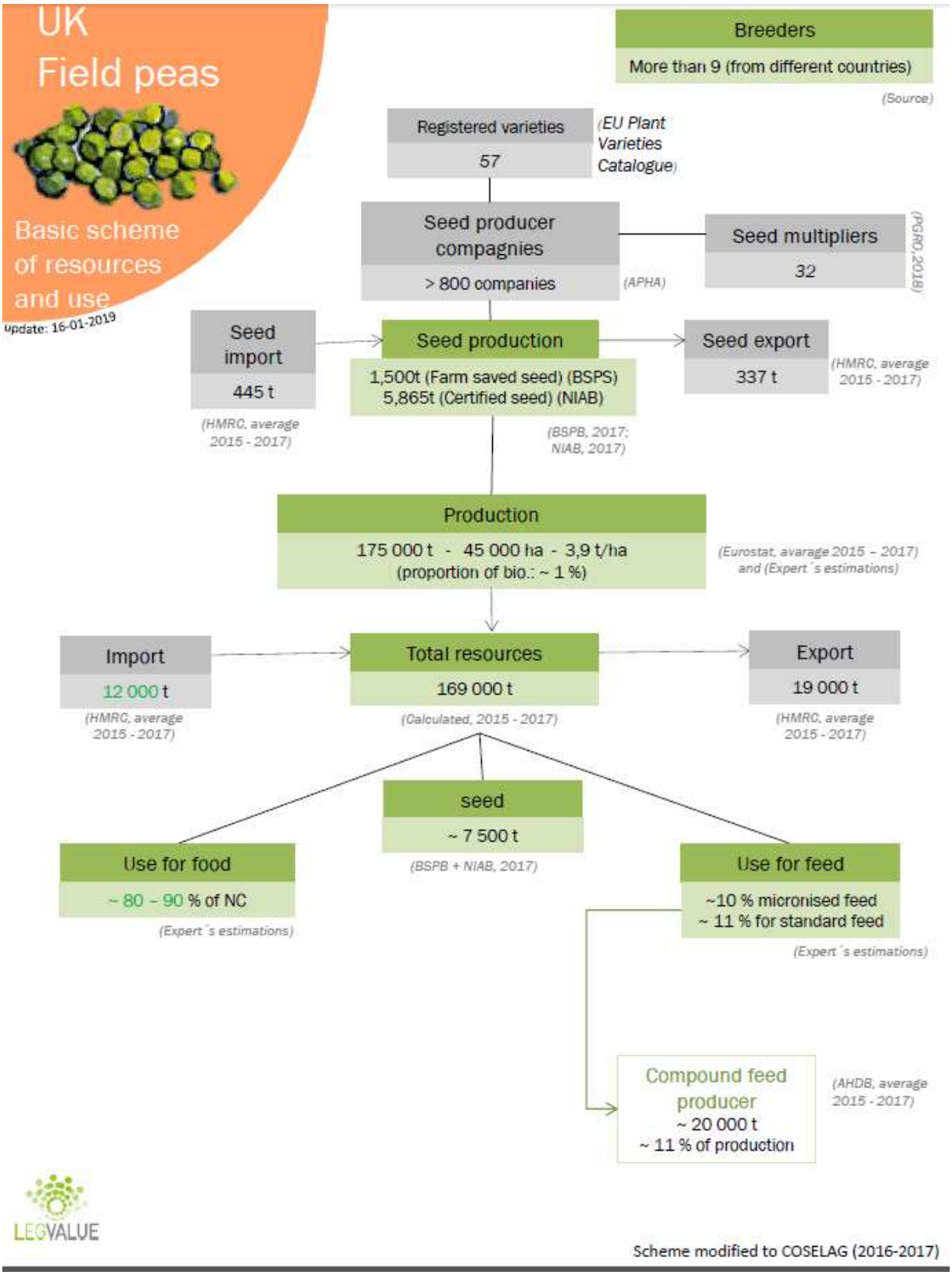

Figure 6: Detailed flow of good for field peas from the seed production to end use in the UK. The numbers written in green indicate an increasing trend.

3.3 Price information of grain legumes in the UK

This chapter examines primarily the price setting of legumes to identify their influencing factors and possible price indicators. Two main categories of prices are identified in previous works: the producer prices (what the farmers receive) and the wholesale prices (mainly between the traders and the processors) these are known as spot prices or market prices. Depending on the quality, these two price categories could be used to derive further prices such as those for import, export and forward market prices. The relation between the producer price and the wholesale price could be determined as in the following formula:

Producer price = Wholesale price – Freight cost – Trade margin – (Cargo handling charges)

In the theory, in such a competitive market, the prices are defined by supply and demand. Stakeholders with stronger influence on prices are the buyers (Compound feed industries, processors and traders) due to the larger quantities at their disposal. The farmers could influence the prices only by the retention of the goods. The farmers are essentially 'price takers' in any commodity market.

An analysis of prices published by the "Farmers weekly Magazine" compared to the history of feed wheat prices published by the "AHDB" clearly shows that the peas and beans prices are closely aligned to the wheat price (see figure 7). Therefore, it can be predicted that feed beans and feed peas prices will be closely linked to the feed wheat futures market. Indeed farmers in the UK wishing to sell their crops forward are offered premiums over feed wheat futures of about £15-20 per tonne. These options are not always available to farmers as they are controlled by the trading patterns of the merchants. The recent poor harvest has led to a complete disconnect between wheat prices and beans prices since 2018 crop. This was last seen briefly in 2013/14.

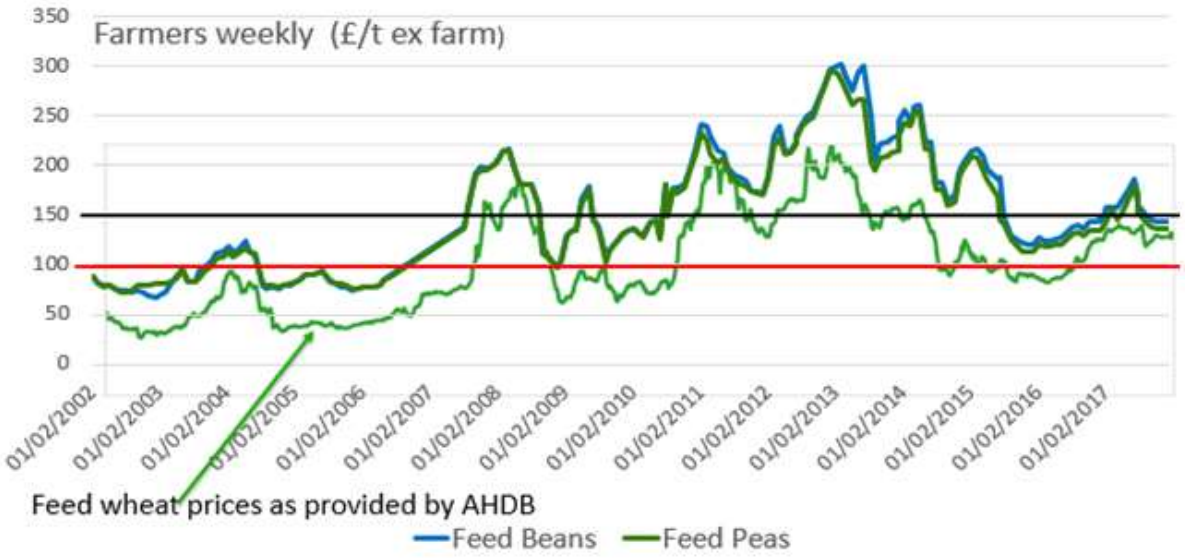

Figure 7: History of prices for grain legumes and feed wheat in the UK (PGRO, 2018).

The grain legume market in the UK has different segments with different prices. Figure 8 presents the spot prices of grain legumes in the different market segments in the UK from 2011 to June 2018. The price trend over the last eight years indicates a volatile market. In general, it should be mentioned that there is a price variation between the regions and the proximity to the end user strongly influences the individual prices on the market. The breakdown of prices between 2015 and 2017 is principally due to the high production in this period.

On average in this period, the price of marrowfat peas (green mature peas) for the human consumption is highest with 297 £/t. It is followed by the price of micronizing peas (240 £/t), beans for the human consumption (213 £/t), feed beans (195 £/t) and feed peas (164 £/t). The quoted prices of marrowfat peas are the average of pale canning types, grocery and export quality. The export quality normally commands additional premium of around 50 £/t and in years of scarcity this has been more than 75 £/t.

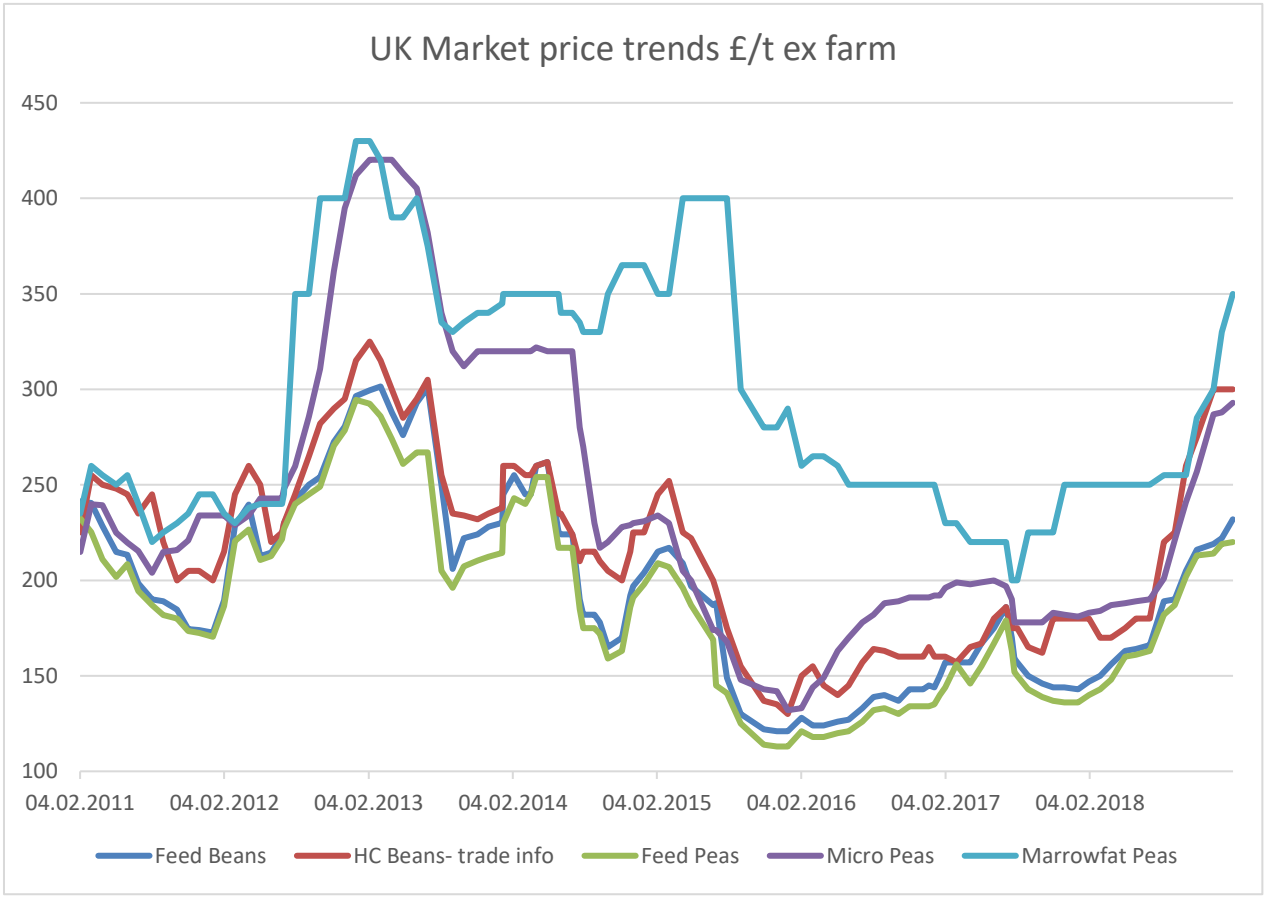

Figure 8: Spot prices of grain legumes in the different market segments in the UK. (Primary data from farmers weekly magazine and trade information; History collected by PGRO).

Influencing factors of the price for legumes

As it is mentioned in the beginning of this chapter, the prices are defined by supply and demand. The premium market of faba beans for the human consumption has premium over faba beans for animal feed.

In the case of field peas, the premium market is also for food, followed by the micronizing peas (for feed) and the standard feed peas. The micronizing process is an infrared heat treatment of grain to improve their nutritional value in feed. The degree of process plays a significant role here. Micronizing peas can be as much as ~£ 75 /t more expensive than feed peas.

Weather conditions are the principal factor influencing production, making yield predictions uncertain. In general, prices are lower in the years with lower return, but global production also affects the UK market. While Australia is a competitor in the bean market export, Canada and Lithuania are competitors in pea market with the UK. Global increases in grain legumes depress prices.

Drying and storage for peas and beans needs to ensure that quality standards are met. Deductions are made for peas on the basis of waste, stain, dry matter, ad mixture (things other than peas), damage or screenings (broken bits), bleaching (loss of colour), soaking ability or cooking quality and moisture content. For beans deductions are more on the basis of moisture, visual appearance, damage and admixture.

Moreover, a small amount of peas and beans is stored over the year and will be carried in the new crop year. This is a useful strategy to influence the prices in profit of the producer or sellers. This carries in strongly varies from year to years. For faba beans, it is estimated by 1,800 t in 2015-16, 23,000 t in 2016-17 and 516 t in 2017-18; for field peas: 13,000 t, 15,500 t and 29,000 t in the respective crop years.

Contracting production enables the negotiation of a price for the produce before drilling. In the UK, they are mainly for a short-term contracts (no more than 2 years because the perceived risks are too high). Ex farm prices are also in part determined by the location within the UK. Costs of transport are significant. Differences in regional values can be seen in the published prices of the magazine Farmers Weekly. Experts mention the Brexit discussion and trade conflict between China and the USA as examples of risks for a long-term contract farming in such a small and more sensitive market.

The prices of alternative commodities in compound feed also influence the prices of legumes. When the prices of faba beans become very expensive in relation with Soya meal or rapeseed meal, faba beans tend to be dropped from the compound feed company least cost formulations.

The prices of organic grain legumes can be doubled of those from conventional farming. The share of organic field peas is less than 1 % and this for faba beans is between 2-5 %. Since this market segment is very small, the market of organic grain legumes has not yet strongly influenced the future of legumes in the UK.

There are some institutions and magazines that collect and publish several prices of legumes. These prices are specific for different regions in the UK:

- Farmers Weekly magazine (http://www.fwi.co.uk/business/prices-trends/): Regional ex farm prices published weekly. Spot and forward prices for beans, feed peas, micronizing peas and other cereals are published here. The source is not declared. The quoted forward prices here could be use as price indicator to predict the future prices.
- AHDB Cereals (https://cereals.ahdb.org.uk/markets.aspx): The AHDB web site tracks past commodity prices and futures prices for animal feed component like wheat, maize and soya beans, but does not include the other legumes**.**

- GOV.UK (https://www.gov.uk/government/statistical-data-sets/commodity-prices): the commodity prices for feeding stuffs (straights concentrates) – monthly in Great Britain can be found here. Field peas and field beans are included in the list and are from Farmers Weekly.
- HMRC (https://www.uktradeinfo.com/Statistics/Pages/Statistics.aspx): besides the import and export quantities, their values of are recorded by the HMRC. These could be used as price indicators in these niches market.

4 Conclusion

The UK market for legumes is dominated by two dry harvested grain legumes: Faba beans with the main use for feed and field peas for food inside the UK. It is assumed that farm saved seed dominates the UK market for bean seed so any statistics for certified seed will be hugely underestimating the actual seed use. For the export, the appropriate varieties are spring seeds. Since the export of faba beans for the human consumption is decreasing, the interest of winter seed varieties is increasing here. For peas, there are currently no winter varieties in the UK. Similar to faba beans, exports of peas from the UK are mainly for human nutrition. Part of it is used in Norway for fish feeding. Unlike exports, imported field peas are used for animal feed, mostly from Russia.

Fresh legumes are used exclusively for food. However, dried legumes use depends on the species and country of destination. While the main use for faba bean in the UK is for feed, the main use for UK faba bean exports is usually for food. In contrast, in the UK, field peas are mainly grown for human consumption with crops that do not make the grade entering the animal feed market.

In general, pulses entering the human consumption market carry a higher value than these going for animal feed. For arable farmers who also have livestock the consumption of beans and peas on farm as home produced feed might be a way to add and retain value within their businesses.

Even though the data for import and export from HMRC is questioned by experts, other statistical resources e.g. those from AHDB, also refer to HMRC. Until now, no better statistics have been proposed for the analysis of imports and exports of legumes, so the data from HMRC data remains most viable for the analysis of the UK foreign trade in legumes.

The prices for wheat, the forward prices of grain legumes from Farmers Weekly magazine and the unit values in foreign trade have been identified as price indicators for the main grain legumes in the UK. This information could help the stakeholder with less influences to understand the market and aid for trading.

Frozen pea production is largely managed by cooperative groups with commitments for production to factory processors. On the other hand, dry grain (Faba beans and field peas) production is largely managed by individual farm enterprises with production contracts with traders.

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