

## **ANALYSIS OF TRENDS IN STUDENT NUMBERS IN AGRICULTURE-RELATED SUBJECTS, 2002/3 – 2012/13**

### **INTRODUCTION**

Agriculture has been identified by HEFCE, the BBSRC and the UK Agritechnology Leadership Council (and others) as a strategic area which needs to build capacity in order to meet the future needs of the sector in supporting the UK's ambition for food security. There have been concerns that the number of opportunities for entering the agriculture profession is limited by the range and choice of options available at all stages of education.

As part of a collaborative project, BBSRC and HEFCE have examined available data from UK Higher Education Institutions on numbers of undergraduate, taught postgraduate and postgraduate research students. The aim of this study is to explore in more detail what the student recruitment situation is like in agriculture in higher education, and to identify any trends that may advise future strategy and policy in supporting higher education and research in addressing government and societal grand challenges in food, agriculture and sustainable development.

### **METHODOLOGY**

#### *Data Source*

Data were generated by HEFCE, using the self-reported information provided by UK higher education institutions (HEIs) to the Higher Education Statistics Authority (HESA). The HEFCE analyses were based on full person equivalent headcounts of the HESA standard registration data, and were rounded to the nearest 5. Where totals were generated, these were based on unrounded data, before themselves being rounded to the nearest 5.

For this analysis, the Joint Academic Coding System (JACS) was used as the basis for identifying students and subjects. Other routes for identification, including using UCAS or other HESA-collected statistics were not used, primarily because agriculture- and agriculture-related subjects are not easily extractable from other data sources.

#### *Data Classifications*

Data were extracted from the broad JACS subject "D: Veterinary Sciences, Agriculture and Related Subjects". Specifically, the following sub-categories were used in the analyses:

- D3: Animal Science
- D4: Agriculture
- D5: Forestry and arboriculture
- D6: Food and Beverage Studies
- D7: Agricultural Sciences
- D9: Others in veterinary sciences, agriculture and related subjects.

For ease of analysis (due to the small numbers categorised), D7 (agricultural sciences) was combined with D4 (agriculture) to provide a total for agriculture. Other subjects

contained within “Veterinary Sciences, Agriculture and Related Subjects”, specifically those within D1 (Preclinical veterinary medicine and dentistry) and D2 (Clinical veterinary medicine and dentistry) were excluded from all analyses. Similarly, sub-classifications contained within D3-7 and D9 (D8 is currently not used) that have relevance to animal/veterinary sciences (such as D310 Veterinary Nursing) are included in the analyses, since breakdown of individual subjects to this level was not possible.

It should be further noted that these data were derived from *self-reported* information provided by HEIs, and so depend on how individual institutions categorise their undergraduate, postgraduate (taught) and postgraduate (research) activities. Comparison was not possible on how different institutions classified subjects.

#### *Data Generation*

Data were generated from HESA records for academic years between 2002/3 and 2012/13, inclusively. Data were broken down based on numbers of students, student mode of study (full- or part-time), level of study (undergraduate, postgraduate taught or postgraduate research) and student domicile (UK, European Union, or non-EU).

Whilst there was no directly-comparable data for STEM and biosciences within UK institutions, data on these areas for English institutions has previously been published by HEFCE<sup>1</sup>, and provided where appropriate for information.

## **RESULTS**

### ***Undergraduates***

#### *Overall Undergraduate Trend*

The number of students enrolled in undergraduate courses is at *Figure 1*. From a low, in 2002/3 of 11,175, there has been an overall increase in the number of undergraduates of 42% to an undergraduate population of 15,860 in 2012/13, although this increase masks annual differences, both positive and negative, as shown in *Table 1*.

---

<sup>1</sup> <http://www.hefce.ac.uk/media/hefce/content/whatwedo/cross-cuttingwork/sivs/stem/HE-subjects-domicile-200203-201213.xls> In particular, attention is drawn to the notes outlining the scope of this analysis.

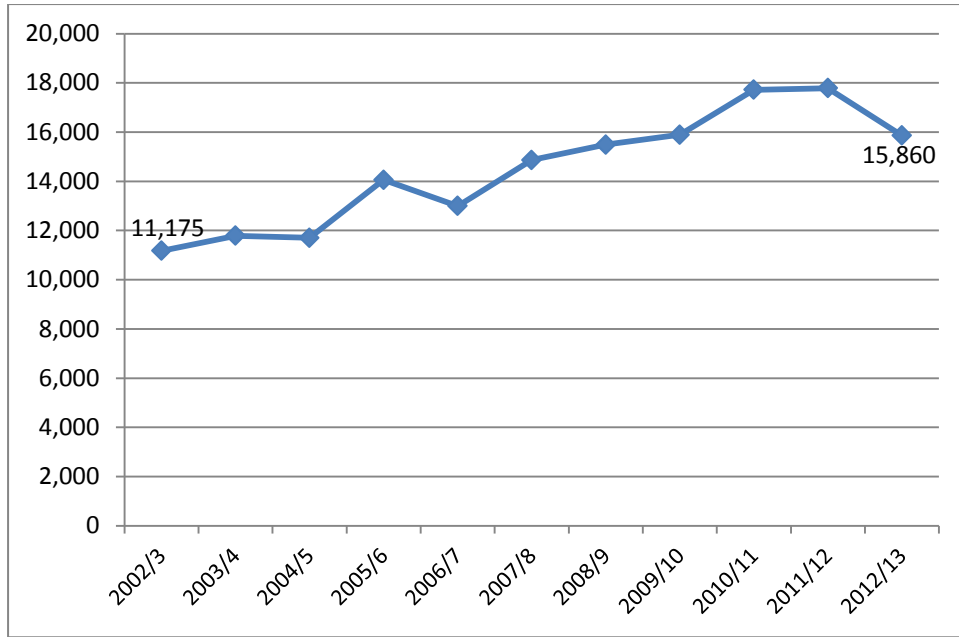


Figure 1 Number of students enrolled on agriculture/forestry undergraduate courses in the UK, 2002/3 – 2012/13

	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	Overall % change
<b>Total</b>	11,175	11,785	11,700	14,055	13,000	14,865	15,490	15,890	17,720	17,785	15,860	
<b>% change on previous year</b>	NA	+5.5	-0.7	-20.1	-7.5%	+14.4	+4.2	+2.5	+11.5	+0.4	-10.8	<b>42.0</b>

Table 1 Annual % change in number of students enrolled on agriculture/forestry undergraduate courses, 2002/3 – 2012/13

In comparison, STEM subjects (in England) have seen a reduction, over the same time-period, of 6%. Conversely, in the same analysis, Biosciences have seen an increase of 37% and chemistry of 40% in student numbers<sup>2</sup>.

#### Topic Trends: Undergraduate

When the overall undergraduate trend shown in *Figure 1* is analysed in more detail, a more complex, topic-specific picture emerges. *Figure 2* shows the overall undergraduate trend, broken down into the five topic classifications

<sup>2</sup> Ibid.

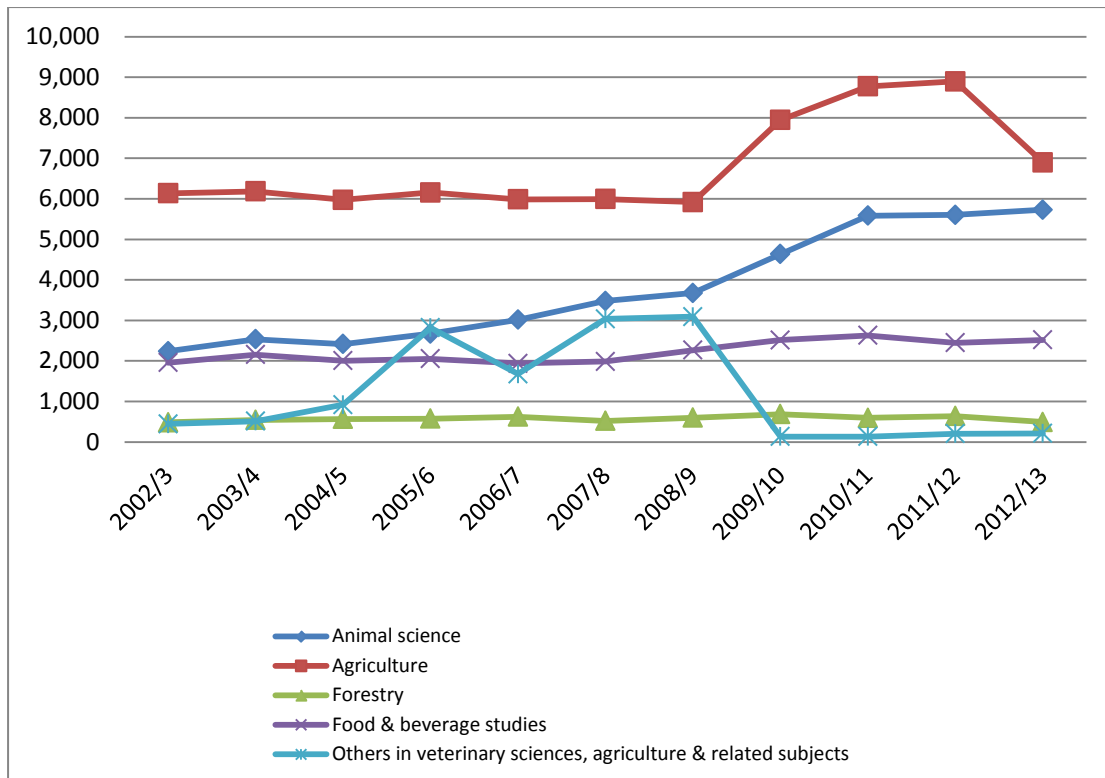


Figure 2 Undergraduate student trends, analysed by JACS topic classification, 2002/3 – 2012/13

The number of students enrolling in courses classified as Animal Science from 2002/3 until 2010/11 showed a strong increase, from 2240 to 5580, after which the increase has plateaued, showing a small increase (of ~200) from 2010/11 until 2012/13. The number of students enrolling in agriculture courses was steady at ~6000 from 2002/3 until 2008/9, where there was a sudden increase in numbers of students, to ~8000. The number of students enrolling in food and beverage studies and forestry both remained relatively stable within the period of analysis.

At the same time as these increases in agriculture and animal sciences, however, the number of students enrolling in subjects classified as 'Others' dropped from 3000 to negligible numbers (135). The magnitude of the decrease in this category between 2008/9 and 2009/10 correlates with the increases seen in the other two categories during the same period.

#### Mode of Study

The number of students enrolling in full- or part-time courses was examined (Figure 3). With the increase in the overall undergraduate population, the gross number of each mode of study increased. However, the *proportion* of students undertaking undergraduate courses on a part-time basis increased from 15.5% on 2002/3 to over a quarter (26.3%) of students in 2012/13.

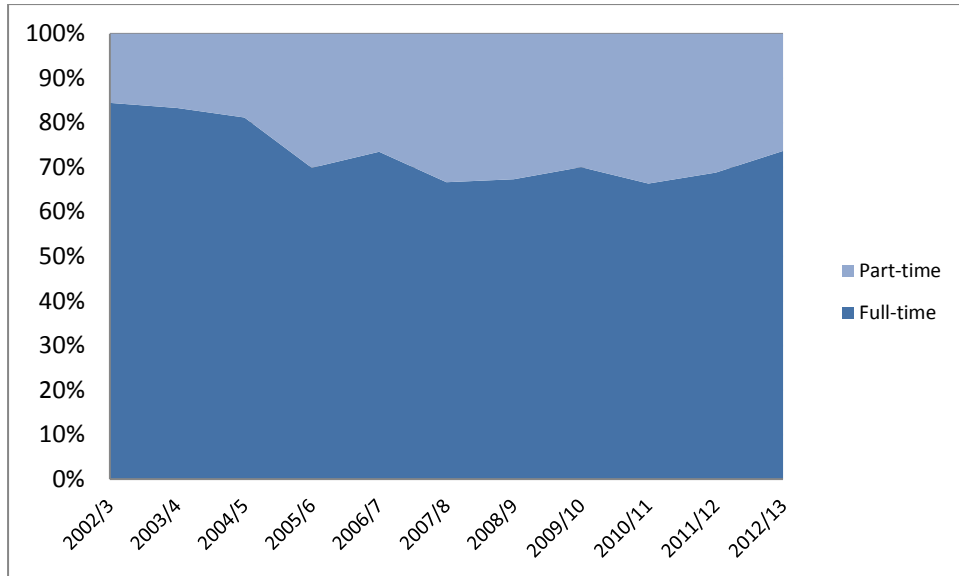


Figure 3 Trends in mode of study of undergraduate students 2002/3 - 2012/13

#### Undergraduate domiciles

In order to gauge the potential future health of the agricultural sector within the UK, the domicile of students was analysed (there is some evidence that non-UK students are less likely to remain within the UK workforce for an extended period post-graduation<sup>3</sup>). Figure 4, Figure 5 and Figure 6 show a breakdown of UK-, EU- and non-EU-domiciled undergraduate students, by JACS topic.

The trends of UK-domiciled students reflects the overall student trend data shown in Figure 2, due entirely to the size of the UK-domiciled student population compared to both non-UK populations combined.

The trends in EU-domiciled undergraduate students vary by topic, with forestry and agriculture being, with some annual differences, relatively stable over the eleven years of the analysis. The number of EU-domiciled students enrolled in animal sciences has increased by approximately half (47% increase), and in food and beverage studies has more than doubled (although still at a very low number).

This increase in food and beverage studies seen in EU-domiciled students is also seen in non-EU-domiciled students, increasing from 125 in 2002/3 to 280 in 2012/13.

<sup>3</sup> NEED REFERENCE

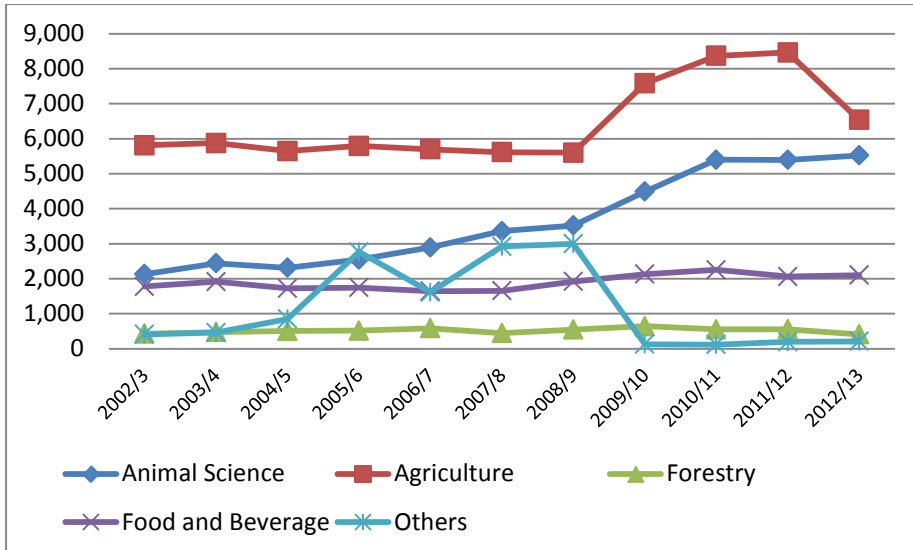


Figure 4 UK Domiciled Undergraduate students, by topic, 2002/3-2012/13

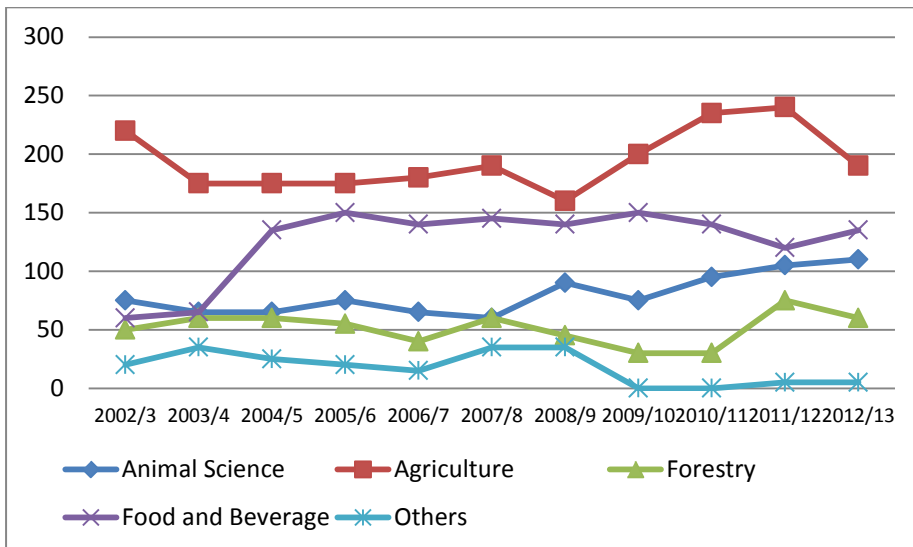


Figure 5 EU Domiciled Undergraduate students, by topic, 2002/3 - 2012/13

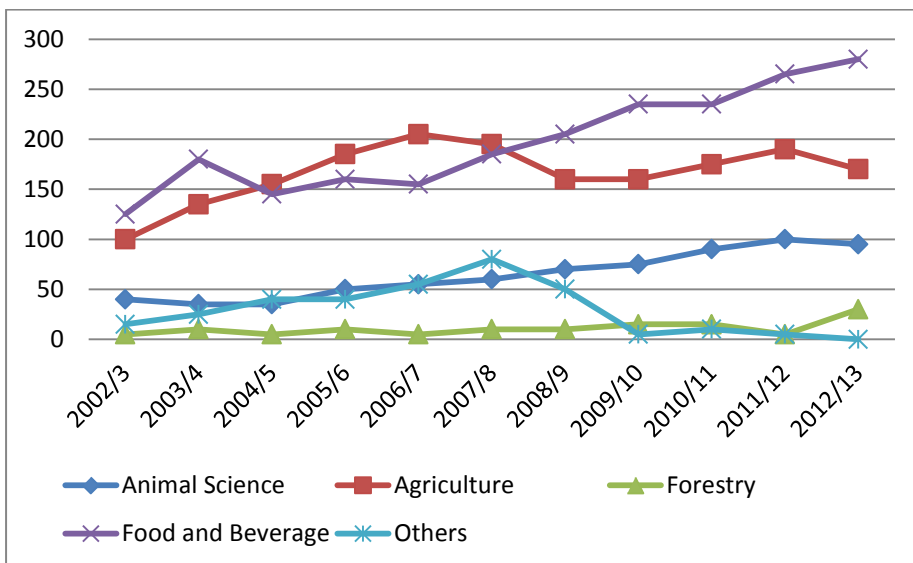


Figure 6 Non-EU Domiciled Undergraduate students, by topic, 2002/3 - 2012/13

**Postgraduate (Taught)**

*Overall Postgraduate (taught) Trend*

The number of postgraduate (taught) (PGT) students was analysed over the reporting period 2002/3 – 2012/3, as shown in Figure 7. This shows that there has been a general flat-line in numbers, between 2002/3 and 2008/9, with a slight increase shown from 2009/10 until 2011/12. A reduction in 2012/13 has resulted in the overall +4.7% change in the population of PGT students. Table 2 shows year-on-year population changes. Attention is particularly drawn to the situation from 2009/10 onwards where there appears to be considerable annual flux.

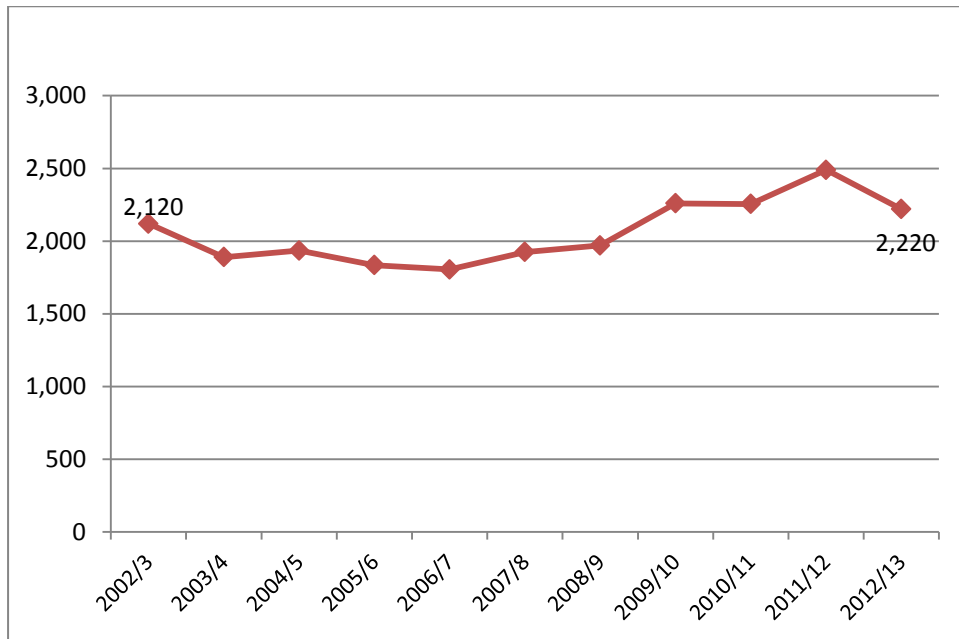


Figure 7 Total Number of Agriculture and Forestry Postgraduate (Taught) students at UK Institutions 2002/3 - 2012/13

	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	Overall % change
<b>Total</b>	2,120	1,890	1,935	1,835	1,805	1,925	1,970	2,260	2,255	2,490	2,220	
<b>% change on previous year</b>	NA	-10.8	2.4	-5.2	-1.6	6.6	2.3	14.7	-0.2	10.4	-10.8	4.7%

Table 2 Annual % change in number of students enrolled on agriculture/forestry postgraduate taught courses, 2002/3 – 2012/13

*Topic Trends: Postgraduate Taught*

The topic-specific trends in PGT are shown in Figure 8. The observed flux of the whole population from 2009/10 was observed in both agriculture and food and beverage studies, although not in forestry or others; there was, at the same time, a doubling of the number of students enrolled in PGT animal sciences.

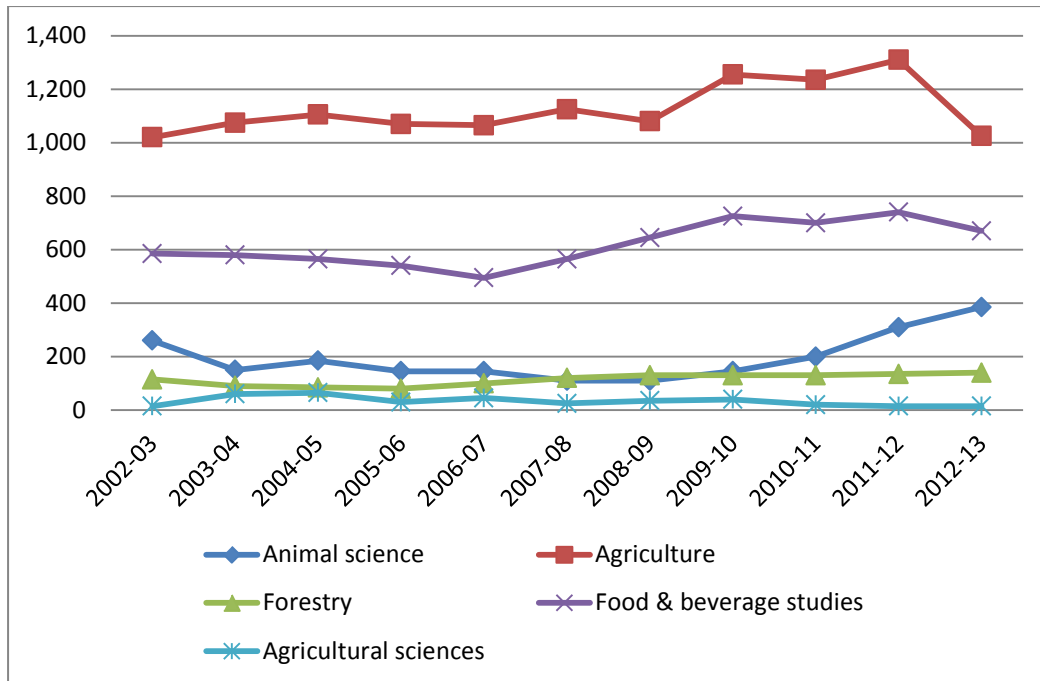


Figure 8 Postgraduate (Taught) trends, by topic, 2002/3 – 2012/13

#### Mode of Study

Figure 9 shows the trends in mode of study of PGT students. The proportion of students undertaking PGT in agriculture/forestry on a part-time basis has remained relatively stable, with 48% of students undertaking their course part-time in 2002/3 and 52% in 2012/13.

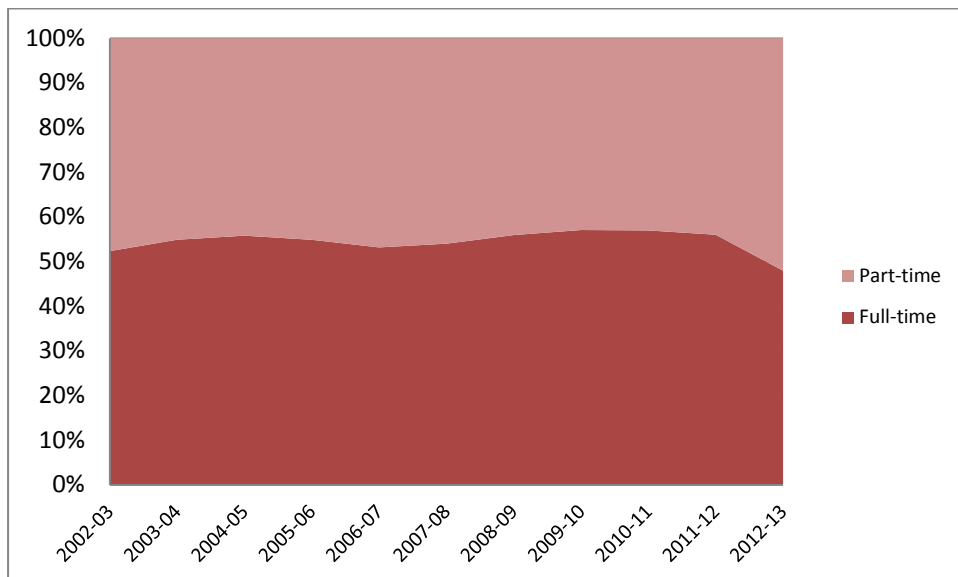


Figure 9 Trends in mode of study of postgraduate (taught) students, 2002/3 - 2012/13

#### Domicile of Postgraduate Taught Students

The breakdown of domicile of PGT students is shown in Figure 10. The number of EU-domiciled students working towards a PGT qualification has remained stable over the



period. Compared to this, the number of non-EU-domiciled PGT students has increased by approximately a third since 2002/3 from around 400 to approximately 600.

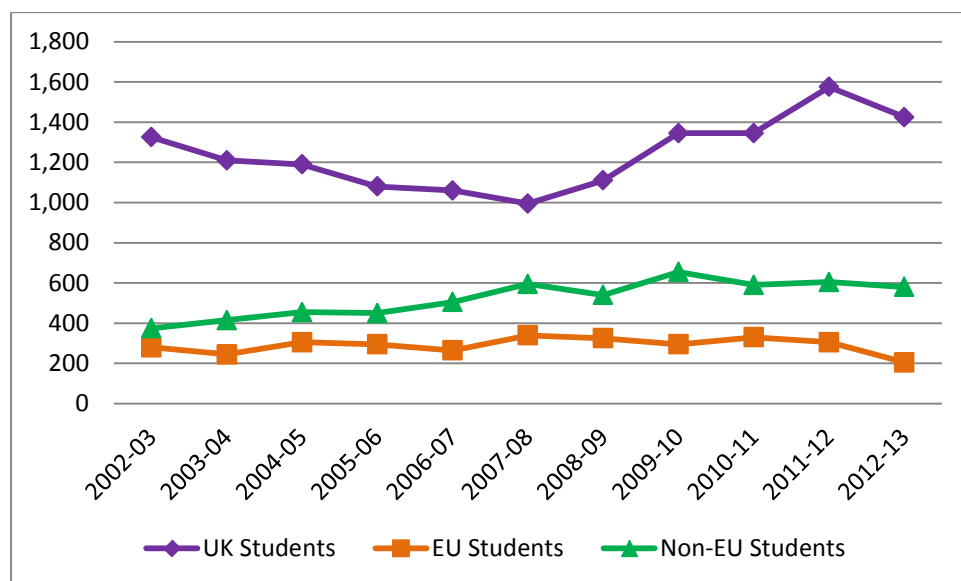


Figure 10 Trends in postgraduate taught student domicile, 2002/3 - 2012/13

The overall trend in UK-domiciled PGT students is a small (7.7%) increase in the number of students from 2002/3 to 2012/13. However, between 2002/3 and 2007/8, the number of students decreased by 25% to a low of 995. From 2007/8 onward, there has been a year-on-year increase, with the exceptions being between 2009/10 and 2010/11 (where the numbers remained constant at 1345) and between 2011/12 and 2012/13 (where there was a decrease from 605 to 580 students).

When these trends are broken down into topic areas, a number of observations can be made. *Figure 11* (UK-domiciled PGT students), *Figure 12* (EU-domiciled PGT students) and *Figure 13* (non-EU-domiciled PGT students) show the trends for each group, broken down into the five topic areas.

The number of UK-domiciled students enrolled in agriculture programmes has remained stable at around 700, with a noticeable increase between 2009/10 and 2011/12. By comparison the number of EU- and non-EU-domiciled students enrolled in agriculture courses has decreased in both groups, with the EU-domiciled student population in particular not showing any stability in student numbers between years.

For food and beverage studies, the number of UK- and EU-domiciles have decreased since 2002/3, with the UK-domiciled numbers rebounding from a low-point in 2007/8 of 195 to 305, 12.5% lower than 2002/3. EU-domiciled students averaged around 100 for most of the period analysed, but have fallen by 44% since 2010/11.

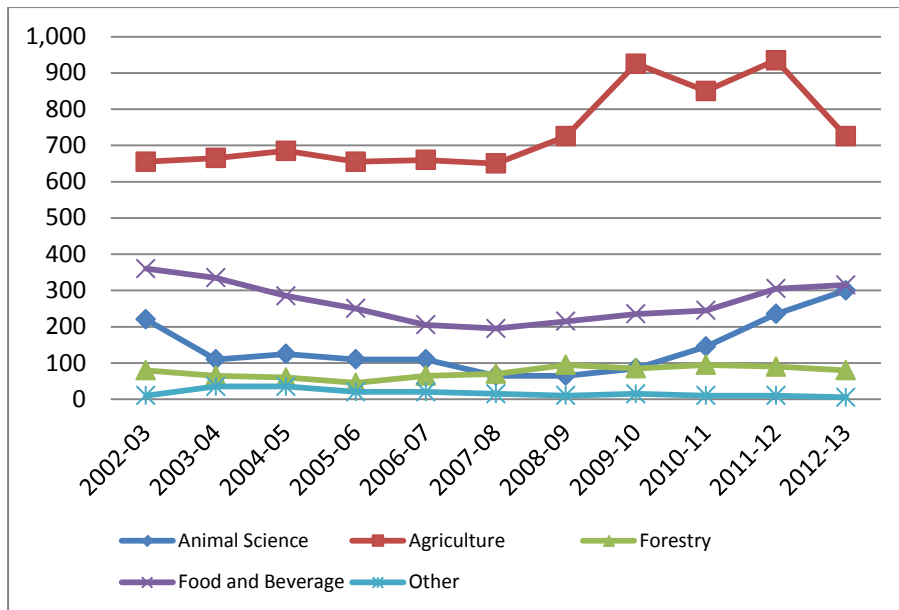


Figure 11 UK Domiciled postgraduate taught students, 2002/3 - 2012/13

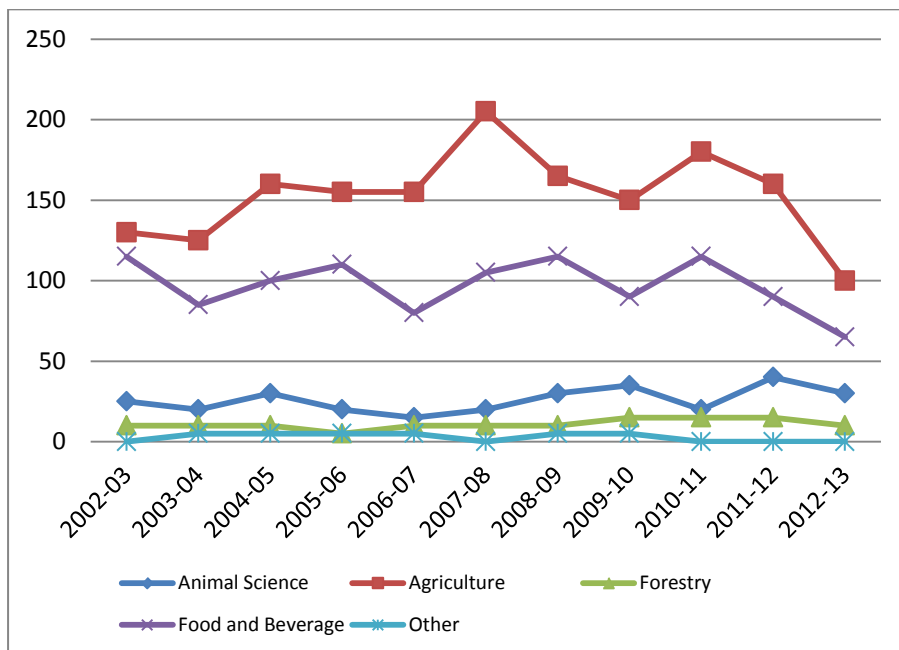


Figure 12 EU Domiciled postgraduate taught students, 2002/3 - 2012/13

In contrast, the number of non-EU-domiciled students on food and beverage studies increased year-on-year from a low of 115 students in 2002/3 to a peak of 400 in 2009/10. A reduction to 295 since that peak has still resulted in a large rise of 156% over the period 2002/3 to 2012/13.

All other topics remained sub-100 students, with the exception of UK-domiciled students on animal sciences courses, which halved in number between 2002/3 and 2003/4, remained stable until 2009/10 and have seen an increase from 85 to 300 since then.

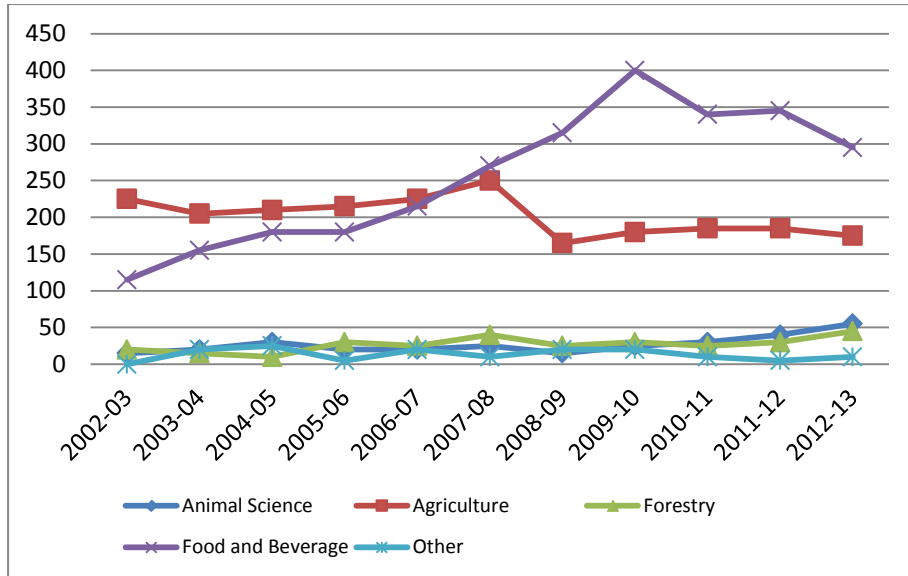


Figure 13 Non-EU Domiciled postgraduate taught students, 2002/3 - 2012/13

### Postgraduate (Research)

#### Overall Trends in Postgraduate Research

The number of postgraduate research (PGR) students, as shown in Figure 14, reduced from 2002/3 every year until 2006/7 (a reduction over that period of 43%). In 2007/8, there was a sharp increase of 135 students from that 2006/7 low, which fell back 30 students to 665 in 2008/9. From then, annual increases were seen, such that the population of PGR students stood at 900 in 2012/13. Table 3 gives some details of year-by-year % changes in PGR student populations, which have declined 8.2% overall.

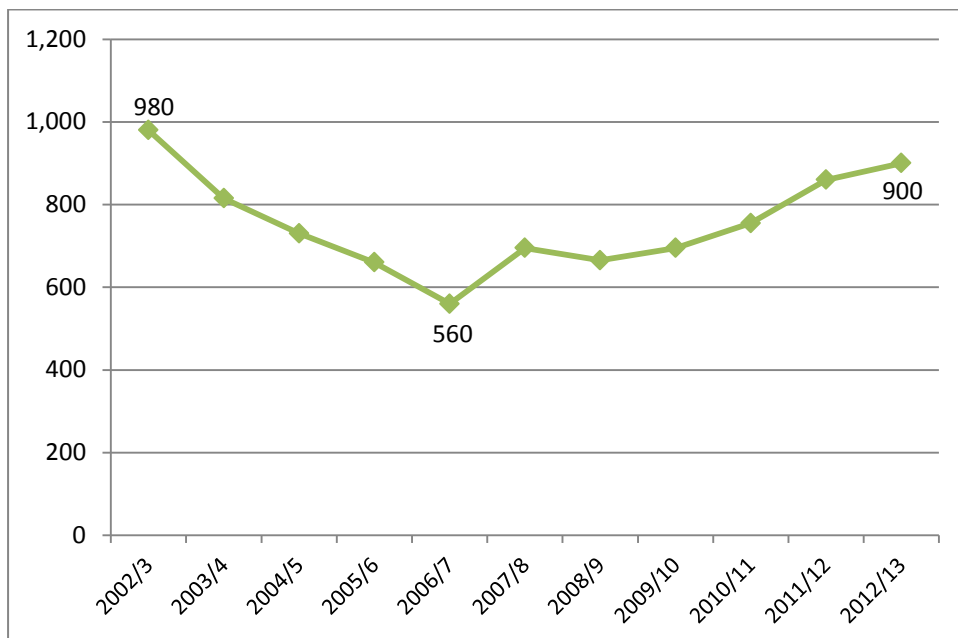


Figure 14 Total number of Agriculture and Forestry Postgraduate (Research) students at UK Institutions 2002/3 - 2012/13

	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	Overall % change
<b>Total</b>	980	815	730	660	560	695	665	695	755	860	900	
<b>% change on previous year</b>	NA	-16.8	-10.4	-9.6	-15.2	24.1	-4.3	4.5	8.6	13.9	4.6	-8.2

Table 3 Annual % change in number of students enrolled on agriculture/forestry postgraduate research courses, 2002/3 – 2012/13

### Topic Trends: Postgraduate Research

Figure 15 breaks down the headline population numbers into topic classifications. The number of students enrolled in forestry or 'other' courses has remained stable over the eleven years of analysis. The number of students registered on animal science courses has increased fourfold since 2002/3, with the most obvious increase occurring between 2006/7 and 2008/9. Since 2008/9, there has been a smaller increase in numbers of students on such courses.

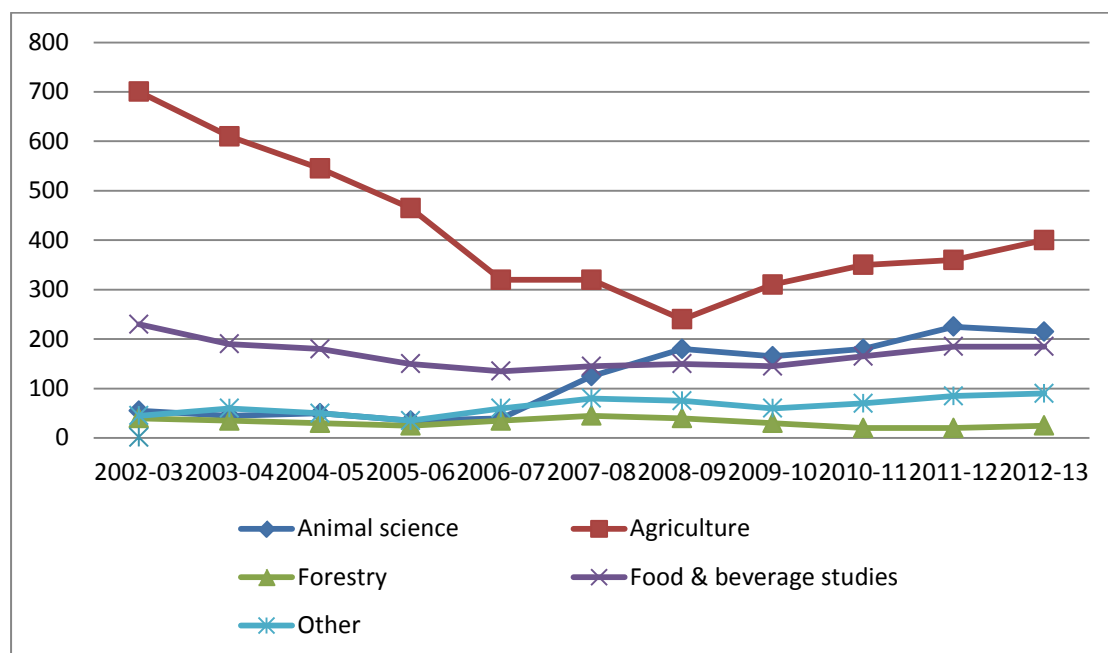


Figure 15 Postgraduate research students, 2002/3 - 2012/13, by topic

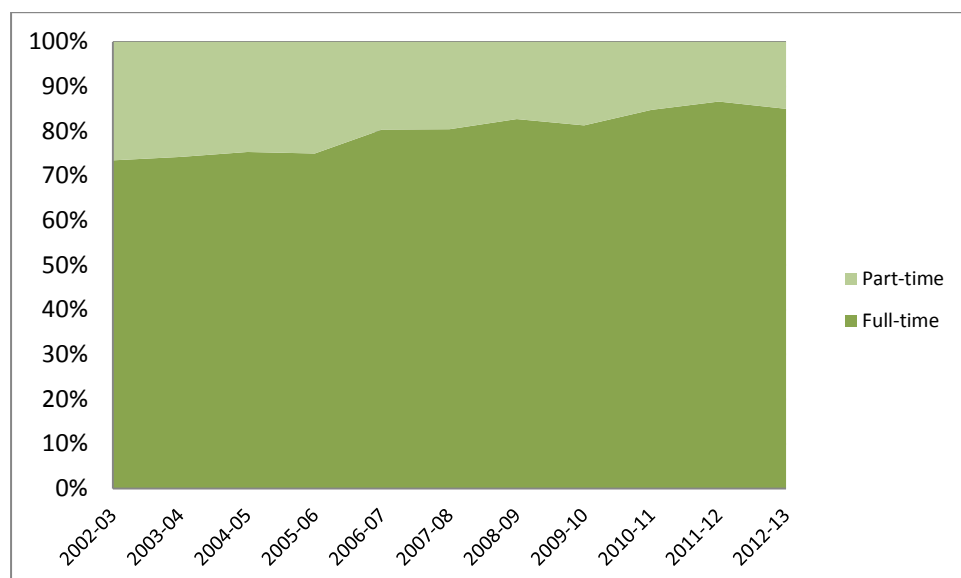
The number of students undertaking PGR education in food and beverage studies has remained at approximately 200, noting however that there was a general (if slight) decline in annual intakes from 2002/3 until 2006/7. Since then there has been a gradual increase in numbers, from 135 in 2006/7 to 185 students in 2012/13.

One area that has shown a noticeable and retained reduction in numbers (i.e. no increase or maintenance of student numbers over the analysis period) is in agriculture PGR. Between 2002/3 and 2008/9, the population of PGR students reduced by almost two-thirds, from 700 to 240 students. From 2008/9, there has been a steady annual

increase in student numbers, up to 400 in 2012/13. Nevertheless, despite this increase, the overall population of agriculture PGR remains 43% below that seen in 2002/3.

#### *Mode of Study*

PGR has, as shown in *Figure 16*, since 2002/3 been predominantly undertaken through full-time study. Twenty seven percent of PGR students in 2002/3 were studying in a part-time capacity. This number reduced to 15% in 2012/13.



*Figure 16 Trends in mode of study of postgraduate (research) students, 2002/3 - 2012/13*

#### *Domicile of Postgraduate Research Students*

The trends in PGR students' domicile are shown in *Figure 17*. The number of UK-domiciled PGR students reduced every year from 2002/3 (535) until 2006/7 (250), where it has partially rebounded to 455 by 2012/13. At the same time, the number of EU students has reduced by a third to 105 students in 2012/13. After four years of decline between 2002/3 and 2005/6, non-EU-domiciled students have increased in number to a population of 345, an increase since 2002/3 of 17%.

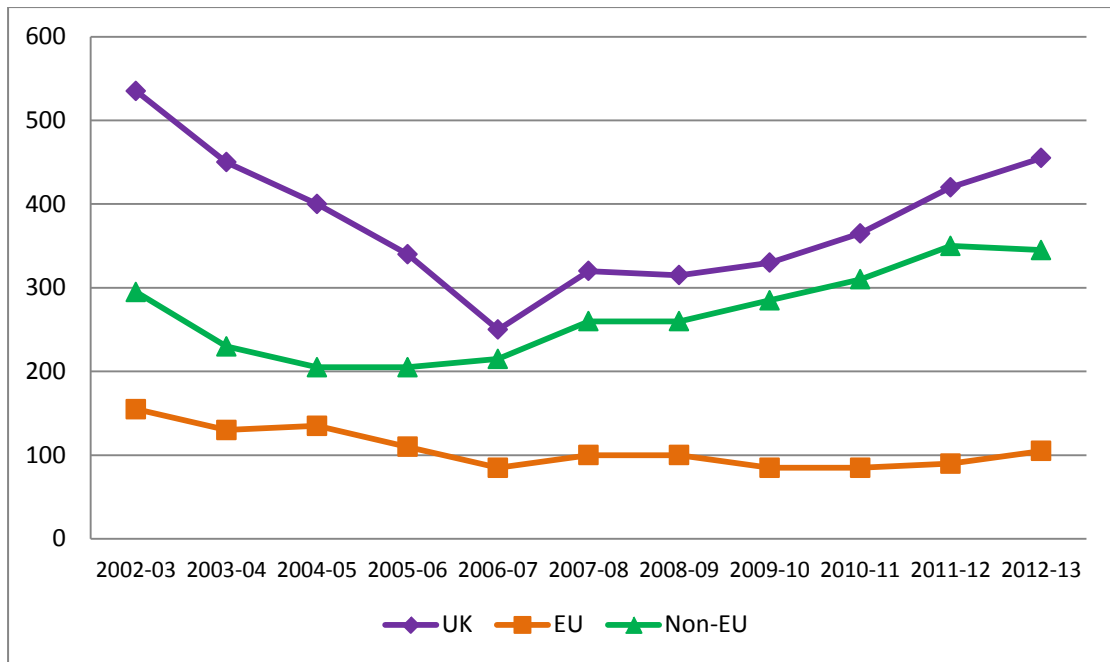


Figure 17 Postgraduate research students, by domicile, 2002/3 - 2012/13

When these are broken down further by topic, as shown in *Figure 18* (UK-domiciled students), *Figure 19* (EU-domiciled students) and *Figure 20* (non-EU-domiciled students), a number of trends can be seen, noting that the individual populations are small. Agriculture PGR students are primarily UK-domiciled, although the proportion of these compared to non-EU-domiciled students is reducing. The number of UK-domiciled agriculture PGR students reduced by over two-thirds from 2002/3 to 2008/9 and had only partially rebounded by 2012/13. A similar pattern was seen in non-UK-domiciled PGR students of agriculture, but the rebound since 2008/9 in that population was almost complete. The small number of EU-domiciled PGR students of agriculture has been slowly reducing to plateau in 2008/9, with the start of a possible rebound only being seen in 2012/13.

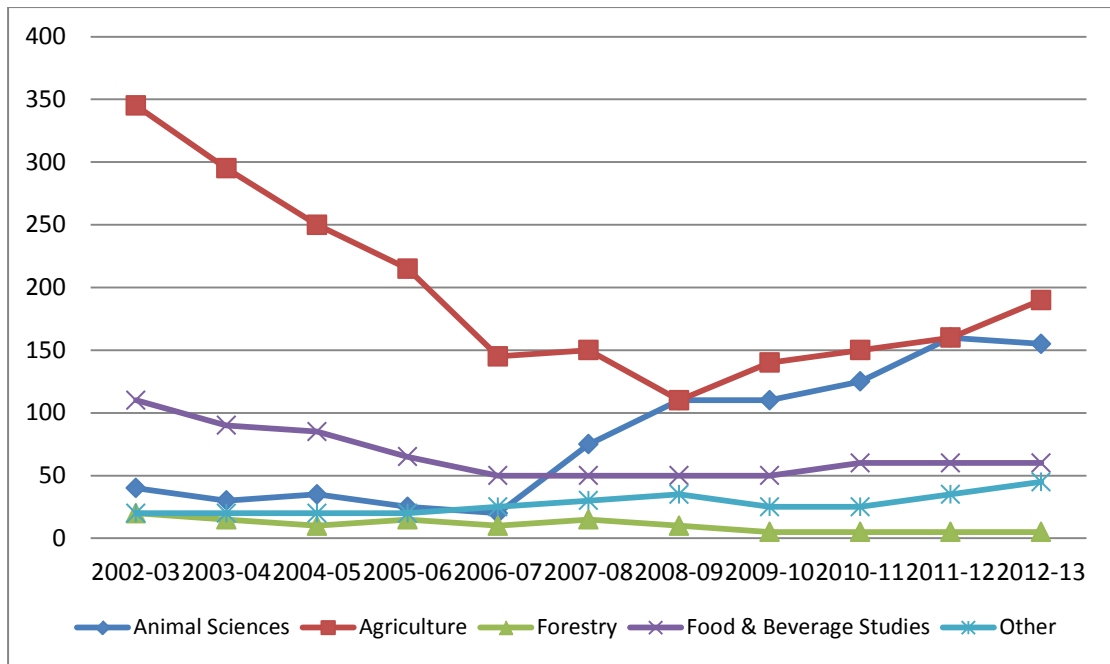


Figure 18 UK Domiciled PGR students, 2002/3 - 2012/13

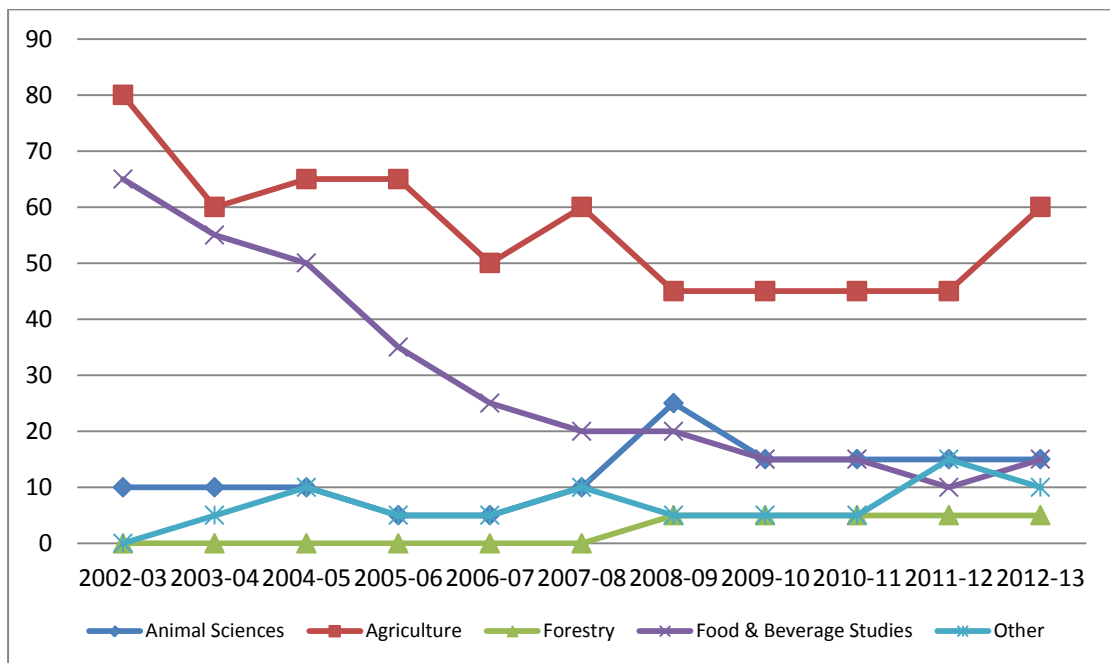


Figure 19 EU-domiciled PGR students, 2002/3 - 2012/13

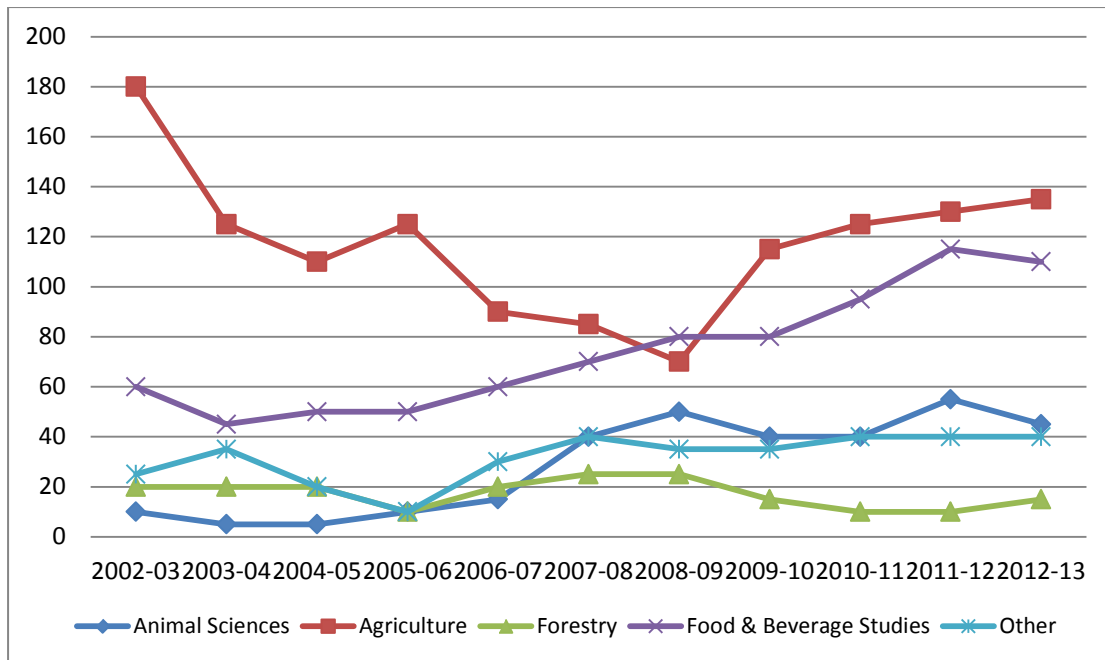


Figure 20 Non-EU domiciled PGR students, 2002/3 - 2012/13

The populations of UK- and non-EU-domiciled animal sciences PGR students increased over the period of study, both increasing approximately four-fold (noting the small base from which they were starting). The number of EU-domiciled students undertaking PGR remained small (10-15).

Across all three populations, the numbers of students taking forestry-related PGR courses remained static, and small.

Finally, in food and beverage studies, the number of EU-domiciled students reduced by 77% to a negligible size (15). The population of UK-domiciled PGR students of food and beverage studies reduced from 110 students in 2002/3 to 60 students in 2012/13. Curiously, at the same time, this pattern was reversed in non-EU-domiciled PGR students, the population of which increased from 60 in 2002/3 to 110 in 2012/13.

## DISCUSSION AND FURTHER CONSIDERATIONS

On the face of it, undergraduate agriculture education is following a trend that is common across higher education. The number of students has been increasing since 2002/3 with a 42% increase, which is in line with other data for (England-only institutions) STEM and bioscience-offering universities. An increase in the part-time population to over a quarter of the undergraduate students may reflect the need for students to work alongside their studies in economically-straitened times, or may be due to this sector's ability to attract students who are seeking career enhancement, changes in direction or with more established family commitments who value the part-time approach. The number of non-UK-domiciled undergraduates (which is indeed mirrored in both cohorts of postgraduate students) should mean a ready supply of graduates for the agriculture, food and related industrial sectors. **An analysis of destinations of graduates would provide further intelligence as to whether agriculture graduates are retained in the sector or have**



**other career trajectories. If they are retained in the sector, for what roles and for which organisations are they employed?**

What is clear is that the number of postgraduate students (both taught and research) remains stubbornly low, and for PGR the overall 8.2% reduction in numbers may be of concern. The reduction in PGR numbers may correlate with reductions in public sector funding for agriculture that took place in the mid-late 1990s and early 2000, where research funding reduced, Defra and its predecessor departments moved away from funding research and there was consolidation and closure of many relevant departments within universities. However, there is a clear trend in PGR that the numbers are increasing, and it may be that the increase in research funding and emphasis on Food Security as a grand challenge by, amongst others, Sir John Beddington (ex-Chief Scientific Advisor) has resulted in a shift towards supporting more PGR students in these areas. **A comparison of PGR funding and research funding would be interesting to determine whether there is any correlation.**

Another area of interest is the number of non-EU-domiciled students (at all stages) that continue to be attracted into UK agriculture courses. The flat-lining, if not reduction, in number of EU-domiciled students may be of concern in the longer term. It will be interesting to see whether agriculture can retain the level of non-EU-domiciled students when the wider sector is struggling due to visa regulations.

In terms of topics, the number of students undertaking particular subjects remains small and dominated by UK-domiciled, full-time students. However, it is interesting that in food and beverage studies at PGR level, the number of UK-domiciled students is now outweighed by non-EU-domiciled students. Might this be of concern to the food industry, who historically struggle with the recruitment of technically and highly skilled individuals?

Overall, the size of the student population in agriculture is small and this may be of concern if there is to be an increasing in capacity within the industrial sectors that rely on agriculture-related knowledge. However, the population is following the trends of the wider sector, and so the question to policymakers might be: **“should agriculture be considered a vulnerable subject within higher education or is it just a small but healthy population that would benefit from growth in order to stimulate innovation and impact? If the latter, how can this be achieved?”**.