



**Confor**  
Promoting forestry and wood

**Upland forestry WALES study -  
Welsh Analysis of Land-use  
Economics & Subsidies**



## Executive Summary

### Comparisons

- The purpose of this study is to make a specific economic comparison between surveyed established productive conifer forests in the Welsh uplands and agriculture on an equivalent area. This study has not endeavoured to quantify the societal benefits (recreation, environment) from forestry or agriculture nor attribute any financial benefits to them. These findings may not be applicable to other situations and Welsh regions nor directly to woodland creation.

### Productivity

- Forestry once established currently produces almost five times the economic output of farming before subsidy due to rising timber production.
- Forestry output has benefited from rising timber prices supported by biofuel demand; farm incomes have suffered rising costs and lower livestock prices lately.
- Forestry in the future is expected to produce one and a half times the economic output of current farming before subsidy as timber production evens out.
- Forestry's spending in the economy is currently double that of farming.
- Long term forestry spending in the economy is expected to stabilise at 90% of current farming expenditure once timber production evens out.
- Once established, forestry trades at a surplus, farming at a loss, before subsidy.

### Employment

- Forestry currently supports 60% more jobs than farming in the surveyed areas due to the higher physical and financial output of forestry activity at present.
- Forestry in the future is expected to support employment close to current average levels employed in farming in the surveyed areas as timber output and restocking activity drops to a lower sustainable long term level as the forest approaches a 'normalised' 40 year rotation. In reality forestry planting tends to be concentrated on poorer hill land where farming employment is likely to be lower than average. Further research on the impact of land quality on employment is recommended.

**Table 1a: WALES forest survey of different land uses on 4,000 ha of hill land**

|                             | Forestry -<br>"normalised 40yr<br>rotation" | Agriculture - hill<br>sheep farms (av<br>2012 &13) |
|-----------------------------|---|--|
|                             |   | <b>£ Total</b>                                     |
| <b>Output</b>               | 1,831,742                                   | 1,196,000  |
| <b>Less Input costs</b>     | 1,496,858                                   | 1,634,000  |
| <b>Surplus/deficit</b>      | <b>334,884</b>                              | <b>-438,000</b>                                    |
| <b>Grants and subsidies</b> | 103,516                                     | 592,000  |

## Public subsidy

- Farming requires a public subsidy of £21,895 per employee to survive.
- Established forestry receives a modest contribution (one fifth that of farming) towards the provision of public benefits.

- Hill sheep farming requires a direct payment subsidy of ~50% of output before subsidy to survive, whilst forestry currently receives a small (~6% of output) grant contribution towards environmental and forest improvement.
- Once established commercial forestry is much less dependent on annual subsidy, however some form of subsidy is likely to be required to offset losses incurred as a result of forestry land taken out of production due to environmental, recreational and landscape constraints and to compete with agriculture for land use. Forestry generates a significant trading surplus before subsidy whilst hill farming trades at a loss.

**Table 1b: WALES forest survey costs and returns for different land uses on 4,000ha of hill land – per ha and per employee**

|                             | Forestry -<br>"normalised 40yr<br>rotation" | Agriculture - hill<br>sheep farms (av<br>2012 &13) |
|-----------------------------|---|--|
|                             |   | £ per ha   |
| <b>Output</b>               | 457.94                                      | 299.00   |
| <b>Less Input costs</b>     | 374.21                                      | 408.50   |
| <b>Surplus/deficit</b>      | <b>83.72</b>                                | <b>-109.50</b>                                     |
| <b>Grants and subsidies</b> | 25.88                                       | 148.00   |
|                             |   | £ per employee*                                    |
| <b>Output</b>               | 80,362                                      | 44,234   |
| <b>Less Input costs</b>     | 65,670                                      | 60,434   |
| <b>Surplus/deficit</b>      | <b>14,692</b>                               | <b>-16,199</b>                                     |
| <b>Grants and subsidies</b> | 4,541                                       | 21,895   |

Source: SAC Consulting, \* FTE = Full Time Equivalent or 1,900 hours

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# 1.0 Introduction and Objectives

## 1.1 Introduction

SAC Consulting has been commissioned by Confor to undertake a study comparing the economic and employment effects of different land uses on hill land across the hill regions of Wales.

Agricultural data on income, subsidy payments and input costs has been obtained from the annual Welsh Farm Business Survey based on the Hill Sheep farm type.

Forestry data on timber sales and prices, management costs and grant income has been obtained from a survey of private forest managers across Wales.

The forestry figures have then been used to develop a longer run modelling exercise for the 4,000 ha of private forestry surveyed. This analysis estimates average annual economic and employment effects over the 40 year forestry production cycle to compare with agricultural production.

## 1.2 Objectives

- 1) Identify approximate current (2012/13 and 2013/14) annual production from forestry, value at forest gate, value delivered to market, and amount of public subsidy.
- 2) Identify approximate current (2012/13 and 2013/14) number of jobs in forestry and delivered to market – covering establishment, ongoing management, deer & pest control, harvesting and haulage.
- 3) Provide an easily read comparison of financial and employment outputs from forestry and farming use of the area – i.e. how many jobs is forestry supporting in the surveyed Welsh forests now and in the future, and how does this figure compare with how many jobs the same land would support if under agriculture?
- 4) Provide a comparison of how much public money went into the surveyed forests last year, compared with what would have been paid in agricultural subsidies.
- 5) Assuming farming had continued today on the full 4,000 ha surveyed forest area, identify at today's prices, similar agricultural production and values to (1) and (2) above.

## 2.0 Forestry survey and model

### 2.1 Forest survey

A survey of private forest managers was conducted across Wales in spring 2015. From this a total of 22 completed returns were achieved representing a gross forest area of 4,023 ha. The mean year of establishment, weighted by forest area, was 1979 making the average forest age 36 years. Forests ranged in year of establishment from 1958 to 1991 and in age from 57 years to 24 years. The bulk of the returns and timber production were from the South Cambrian and Upper Corris regions. Table 2 below details the breakdown of returns by region, mean forest age and timber produced.

**Table 2: WALES forest survey – average returns (2012/13 & 2013/14)**

| Region                  | Nos of returns | Gross forest area (ha) | Mean year established (yr) * | Mean age* (yrs) | Timber produced (t)# | Timber produced (t/ha) |
|-------------------------|----------------|------------------------|------------------------------|-----------------|----------------------|------------------------|
| <b>South Cambrian</b>   | 8              | 1,914                  | 1968                         | 47              | 72,644               | 38                     |
| <b>Upper Corris</b>     | 6              | 1,081                  | 1978                         | 37              | 39,020               | 36                     |
| <b>Brecon Beacons</b>   | 5              | 729                    | 1981                         | 34              | 11,500               | 16                     |
| <b>Llanbrynmair</b>     | 3              | 299                    | 1966                         | 49              | 1,394                | 5                      |
| <b>Total or Average</b> | <b>22</b>      | <b>4,023</b>           | <b>1979</b>                  | <b>36</b>       | <b>124,558</b>       | <b>31</b>              |

In order to determine current management activity, financial performance and employment effects SAC Consulting prepared a survey and with the assistance of Confor staff it was sent to a range of forest managers across Wales.

The response from forest managers was extremely good, with over 60% of forest managers providing survey data.

Survey results were then compiled to provide representative figures for the forests as a whole. The key data determined for use in the following forestry model were as follows:

- Average timber yield in tonnes per ha at felling
- Average timber prices in £ per tonne standing and delivered to processor
- Average costs of forest operations in £ per ha including;
  - o Restocking
  - o Establishment
  - o Harvesting
  - o Haulage
  - o Pest control
  - o Management and professional fees
- Average employment levels by activity

## 2.2 Forest modelling assumptions

As a group of relatively young forests, the average production profile of the forests in the survey meant they were yet to reach a steady state. Currently the harvested area and timber output is at a relatively high level and this will continue for 5 to 10 years before dropping back again for another decade or so while younger restocked forests mature. Within 20 years it is expected the forest will move close to a more stable long term production profile.

In order to present figures more representative of the forest in the medium to longer term, a model has been developed. The assumptions behind this model are as follows;

### Productive forest area

- When established the total forest area of 4,000ha would have comprised 10% bare land and 90% (3,600ha) productive conifer forest. This would have been compliant with the UKFS<sup>1</sup> of the day and the majority of the crops being harvested would be certified under FSC<sup>2</sup>. In future a smaller proportion will be established as productive conifer under today's UKFS. However, total timber volumes produced in the future from the productive conifer crop may not decrease significantly due to the use of significantly improved genetic planting stock, the benefits of localised shelter arising from a more diverse forest structure and improved silvicultural techniques. The forest will also give additional public value for biodiversity, water protection and recreation.

### Timber output

- The mean age of establishment of the surveyed forests was 1979. The productive lifespan of commercial conifers in Wales is typically around 40 years with a range between 30 and 50 years depending on the site. Currently much of the forest is at, or approaching, maturity and felling volumes are elevated as a result. Timber production will be maintained at this level for most of the next decade before levelling out into a more consistent annual felling pattern.
- The average rotation length achieved of 40 years will then result in felling of 1/40<sup>th</sup> of the assumed productive forest area (3,600 ha) per year which equates to 90 ha per year.
- This area of felling will yield an annual timber crop of 430.9t per ha (the average from the survey) giving a total timber output across the 90ha felled of 38,785t.
- The average timber price achieved for this is assumed to be the same as averaged from the survey of £26.31/t standing and £47.23/t delivered processor.
- The annual value of timber sales will therefore equate to £1.02m standing and £1.83m delivered to the processor.

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<sup>1</sup> UK Forest Standard

<sup>2</sup> Forest Stewardship Council

### Subsidy income

- It is assumed that public subsidy to the forest will continue at the same rate per ha as obtained from the survey of £25.88 per ha of total forest estate (including bare land) to give a total annual subsidy income across the 4,000ha of £103,516 pa.
- Subsidy to the forest takes the form of a contribution towards the public benefit of restructuring the forest, whereby at considerable cost to the forest owner, uneven ages of crop are created, with more diverse tree species, and open ground is left for wildlife and biodiversity

### Input costs

- It is assumed that the costs of forest operations will continue at the same rate per ha as obtained from the survey as detailed below. Average costs of forest operations in £ per ha including;
  - o Restocking on 90 ha - £1,500 per ha – total cost £135k pa
  - o Establishment on 216ha (3yrs) - £417 per ha – total cost £90k pa
  - o Deer and pest control on 4,000 ha - £2 per ha – total cost £8.8k pa
  - o Harvesting on 90 ha - £4,552 per ha – total cost £410k pa
  - o Haulage on 90 ha - £4,462 per ha – total cost £402k pa
  - o Roothing on 4,000 ha - £54 per ha – total cost £216k pa
  - o Management and professional fees on 4,000 ha - £27 per ha – total cost £108k pa
- Out with the survey of forest managers, additional costs have been added to reflect the notional land rental costs. While forestry land is seldom if ever rented, the farming input costs include a cost for rent & borrowings and accordingly for better comparison this notional cost is included against forestry. The figure used has been taken from Smiths Gore Agricultural rent Survey 2014; where the 2014 average rent paid on Agricultural Holdings Act holdings for Grade 5 land (hill grazing) was £32 per hectare.

Full details of the results are contained in the following section.



## 2.3 Forest modelling results

**Table 3: WALES forest survey timber output**

| Year                                 | Felled (ha) | Yield (t/ha) | Quantity (t) |
|--------------------------------------|-------------|--------------|--------------|
| A) 2012                              | 187         | 447          | 83,480       |
| B) 2013                              | 387         | 423          | 163,637      |
| C) 2 yr average 2012-14              | 287         | 435          | 123,559      |
| D) Annual normalised 40 yr. rotation | 90          | 431          | 38,785       |

Source: SAC Consulting survey of forest managers

**Table 4: WALES forest survey timber sales and revenue**

| Year                        | Timber price basis  | Value (£) | Price (£/t) |
|-----------------------------|---------------------|-----------|-------------|
| A) 2012                     | Standing            | 2,075,315 | 24.86       |
|                             | Delivered processor | 3,897,683 | 46.69       |
| B) 2013                     | Standing            | 4,426,785 | 27.05       |
|                             | Delivered processor | 7,773,161 | 47.50       |
| C) 2 yr average 2012-14     | Standing            | 3,251,050 | 26.31       |
|                             | Delivered processor | 5,835,422 | 47.23       |
| D) Annual normalised 40 yr. | Standing            | 1,020,506 | 26.31       |
|                             | Delivered processor | 1,831,742 | 47.23       |

Source: SAC Consulting survey of forest managers

**Table 5: WALES forest survey grant income**

| Year                                 | Total (£) | Total (£/ha) |
|--------------------------------------|-----------|--------------|
| A) 2012/13                           | 93,573    | 23.56        |
| B) 2013/14                           | 114,598   | 28.14        |
| C) 2 yr average 2012-14              | 104,086   | 25.85        |
| D) Annual normalised 40 yr. rotation | 103,516   | 25.88        |

Source: SAC Consulting survey of forest managers

**Table 6 – WALES forest survey forestry expenditure**

| Forest operation          | A) 2012          | B) 2013          | C) 2 yr average<br>2012-13 | D) Annual<br>normalised 40 year<br>rotation |
|---------------------------|------------------|------------------|----------------------------|---|
| Restocking                | 151,864          | 281,757          | 216,810                    | 135,038                                     |
| Establishment             | 183,284          | 103,617          | 143,450                    | 90,025                                      |
| Deer and pest control     | 5,379            | 12,331           | 8,855                      | 8,807                                       |
| Harvesting                | 981,871          | 1,628,188        | 1,305,030                  | 409,650                                     |
| Haulage                   | 840,554          | 1,718,189        | 1,279,371                  | 401,595                                     |
| Roading                   | 212,961          | 220,920          | 216,941                    | 215,754                                     |
| Management & professional | 104,626          | 112,542          | 108,584                    | 107,990                                     |
| Notional land rental*     |                  |                  |                            | 128,000                                     |
| <b>Total</b>              | <b>2,480,539</b> | <b>4,077,543</b> | <b>3,279,041</b>           | <b>1,496,858</b>                            |

Source: SAC Consulting survey of forest managers, except \* calculated by SAC Consulting using average rental values from Smiths Gore Agricultural Rent Survey 2014 See Appendix 1 for full details.

## 2.4 Additional costs - financing restocking and establishment

The costs and returns detailed in the previous pages do not account for the opportunity cost of forest planting and establishment which must be made up to 40 years in advance of the main income stream from final felling.

In the past the cost of financing the planting of forests in Wales was met by a combination of government grants, tax incentives and private capital. Looking ahead to the next 40 years, the cost of restocking of commercial forest areas must now be met by private capital. This carries a financing cost which has been calculated in the following way.

The annual cost of financing restocking and establishment has been calculated on a capital and interest repayments basis over the period; 40 years for restocking and 38 years (for establishment). The interest rate has been taken as the average of the Bank of England base rate over the last 10 years to May 2015 which equals 2.08%. The results are shown in Table 7 which reveals an annual financing cost of £183,507. This cost could be met from the annual surplus expected to be generated by the forestry activity of £0.335m (before subsidy). Alternatively this cost may be met separately by the private forest owners who may benefit from tax benefits on their forest investment.

**Table 7 – financing costs**

| Activity      | Expenditure (£) | Interest rate (%) | Term of loan (yrs.) | Total Interest cost (£) |
|---------------|-----------------|-------------------|---------------------|-------------------------|
| Restocking    | 135,038         | 2.08%             | 40                  | 112,351                 |
| Establishment | 90,025          | 2.08%             | 38                  | 71,156                  |
| <b>Total</b>  |                 |                   |                     | <b>183,507</b>          |

Source: SAC Consulting and Bank of England

## **3.0 Agricultural output estimates**

### **3.1 Farm Business Survey background**

Physical and financial data for hill sheep farming in Wales was drawn from the Farm Business Survey undertaken by Aberystwyth University. This survey has been in operation for 75 years and collects data from over 550 randomly selected Welsh farms. Data collected includes financial, economic and some physical information on outputs, inputs, income and balance sheets. This physical data was used to classify the surveyed farms according to its type and size. Full details of the survey are available on the Aberystwyth University website <http://www.aber.ac.uk/en/ibers/science-into-practice/fbs/>

### **3.2 Farm data used in the study**

For the purposes of this study, the most appropriate farm type within the FBS was viewed to be hill sheep farms. These were farms that were mainly in Severely Disadvantaged Areas and derived the vast majority of their income from sheep farming. This data was obtained from a total of up to 17 farms from across Wales which were over 60 European Size Units (ESU) (these being the larger farms in the sample) with an average size of 100 ESU in the latest period 2013/14. In the same period these farms averaged 688ha in size. Average livestock numbers per farm were 31 beef cows, 87 other cattle (calves and followers), 2,607 breeding sheep and 1,625 other sheep.

Output values for livestock are stated on the same basis as timber sales i.e. as delivered values to the market or abattoir with the costs of related haulage and commission included within the livestock input costs.

The financial results from these farms have then been extrapolated to represent the impact of this type of farming on an area of hill land equivalent to 1ha and 4,000ha over five and two year averages. These results are displayed in Tables 8 a & b.

### 3.3 Results

Table 8a – agricultural financial output – Hill Sheep Farms (over 60 ESU) – per ha

|  |            | Average - 5 year<br>2010 to 2014 | Average - 2 year<br>2013 & 14 |
|--|------------|----------------------------------|-------------------------------|
|  | Unit       | Hill area per<br>hectare         | Hill area per<br>hectare      |
| <b>FINANCIAL OUTPUT</b>                    |            |                                  |                               |
|  |            | £ per ha                         | £ per ha                      |
| Total Crops                                | (£)        | 3                                | 4                             |
| Cattle                                     | (£)        | 50                               | 56                            |
| Sheep                                      | (£)        | 215                              | 216                           |
| Other income                               | (£)        | 0                                | 1                             |
| Non farm income (misc)                     | (£)        | 18                               | 22                            |
| <b>Total Output (before<br/>subsidies)</b> | <b>(£)</b> | <b>287</b>                       | <b>299</b>                    |
| <hr/>                                      |            |                                  |                               |
| <b>Total Grants &amp; Subsidies</b>        | <b>(£)</b> | <b>168</b>                       | <b>148</b>                    |
| <hr/>                                      |            |                                  |                               |
| Of which:                                  |            |                                  |                               |
| Single Farm Payment                        | (£)        | 123                              | 111                           |
| Other                                      | (£)        | 44                               | 37                            |
| <b>Total Inputs</b>                        | <b>(£)</b> | <b>376</b>                       | <b>409</b>                    |
| <hr/>                                      |            |                                  |                               |
| <b>Total Output</b>                        | <b>(£)</b> | <b>455</b>                       | <b>448</b>                    |
| <hr/>                                      |            |                                  |                               |
| <b>FARM BUSINESS INCOME:</b>               | <b>(£)</b> | <b>79</b>                        | <b>38</b>                     |
| <b>***Published***</b>                     |            |                                  |                               |

**Table 8b – agricultural financial output – Hill Sheep Farms (over 60 ESU) – total for 4,000 ha**

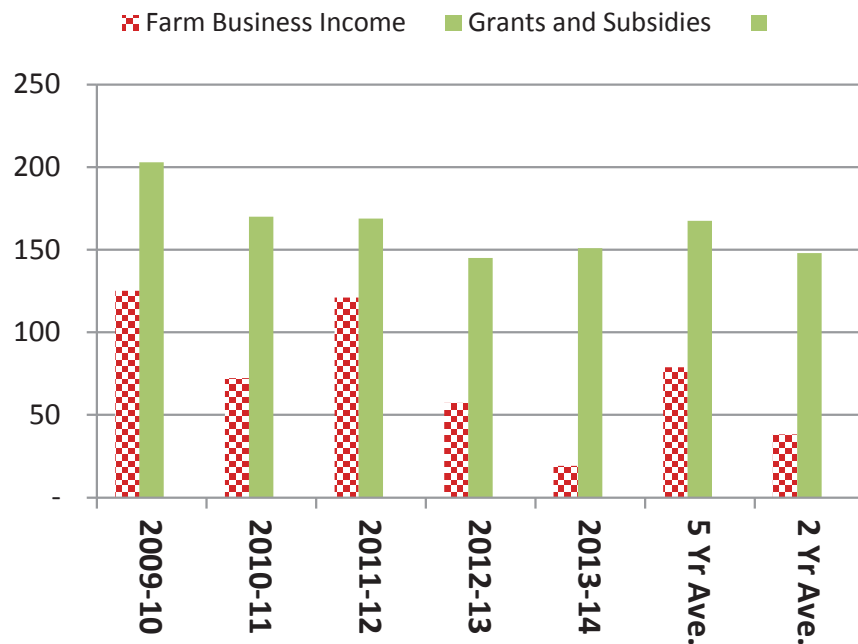
|  |      | Average - 5 year<br>2010 to 2014   | Average - 2 year<br>2013 & 14         |
|--|------|------------------------------------|---------------------------------------|
|  | Unit | Hill area equivalent<br>to 4,000ha | Hill area<br>equivalent to<br>4,000ha |
| <b>FINANCIAL OUTPUT</b>                |      |                                    |                                       |
|  |      | £                                  | £                                     |
| Total Crops                            | (£)  | 10,410                             | 14,000                                |
| Cattle                                 | (£)  | 201,316                            | 224,000                               |
| Sheep                                  | (£)  | 860,308                            | 864,000                               |
| Other income                           | (£)  | 2,237                              | 4,000                                 |
| Non farm income (misc)                 | (£)  | 74,122                             | 88,000                                |
| <b>Total Output (before subsidies)</b> | (£)  | <b>1,148,392</b>                   | <b>1,196,000</b>                      |
| <hr/>                                  |      |                                    |                                       |
| <b>Total Grants &amp; Subsidies</b>    | (£)  | <b>670,507</b>                     | <b>592,000</b>                        |
| <hr/>                                  |      |                                    |                                       |
| Of which:                              |      |                                    |                                       |
| Single Farm Payment                    | (£)  | 493,068                            | 444,000                               |
| Other                                  | (£)  | 177,439                            | 148,000                               |
| <b>Total Inputs</b>                    | (£)  | <b>1,502,822</b>                   | <b>1,634,000</b>                      |
| <hr/>                                  |      |                                    |                                       |
| <b>Total Output</b>                    | (£)  | <b>1,818,899</b>                   | <b>1,790,000</b>                      |
| <hr/>                                  |      |                                    |                                       |
| <b>FARM BUSINESS INCOME:</b>           | (£)  | <b>316,078</b>                     | <b>152,000</b>                        |
| <b>***Published***</b>                 |      |                                    |                                       |

Source: Wales Farm Business Survey and SAC Consulting.

These figures are expressed as five or two year averages (as per the forestry survey) as these farms have been subject to a great deal of volatility in recent years with estimated Farm Business Income (including subsidy) ranging from a high of £501,270 in 2009/10 to an estimated low of £74,477 in 2013/14 (appendix 2). This volatility results from wide variations in sheep and cattle prices and the cost of inputs such as feed and fertiliser. For both cattle and sheep, prices have reached record highs in recent years; however prices have fallen sharply of late. Additionally weather conditions have impacted on both physical output and input costs. Notably the poor weather of 2012/13 resulted in increased bought-in feed costs and the severe snow falls of spring 2013 resulting in significant stock losses and poor physical performance.

In the past five years the profitability of these hill farms have varied from the equivalent of £125/ha (in 2009/10) to £19/ha (in 2013/14). FBS figures show that these hill sheep farms remain very reliant on grants payments and subsidies with agriculture on average returning a loss to the farm business. The following graph shows that support payments are more than 100% of the Farm Business Income on average as agriculture returns a loss to the farm accounts.

**Chart 1 – Farm Business Income vs Support payments – Welsh Hill Sheep Farms (over 60 ESU)**



The recent drop in income comes partly as support payments have declined in recent years particularly after the withdrawal of Tir Mynydd payments in 2013. On the agriculture side input costs have increased sharply up 18% in 2013/14 compared with 2009/10. These rising input costs have not been met by the same rises in output values. While there has been a notable decline in incomes since 2011/12 this comes as extremely volatile markets and weather have impacted significantly. This is especially the case for 2013/14 where the extreme snow fall at lambing time added costs and reduced output significantly. As such 2014/15 may prove to a return to more 'normal' performance after largely benign conditions both weather and market related over the period. (See Appendix 2 for full details).

While future years may not be as extreme volatility is now an ever present feature for farmers whether it be weather or market related. In conclusion while the past couple of years may be extreme examples; reducing support payments, increasing costs and variable market returns mean that these Welsh hill farms are likely to remain under financial pressure and reliant on support payments.

## 4.0 Comparison of forestry and agriculture

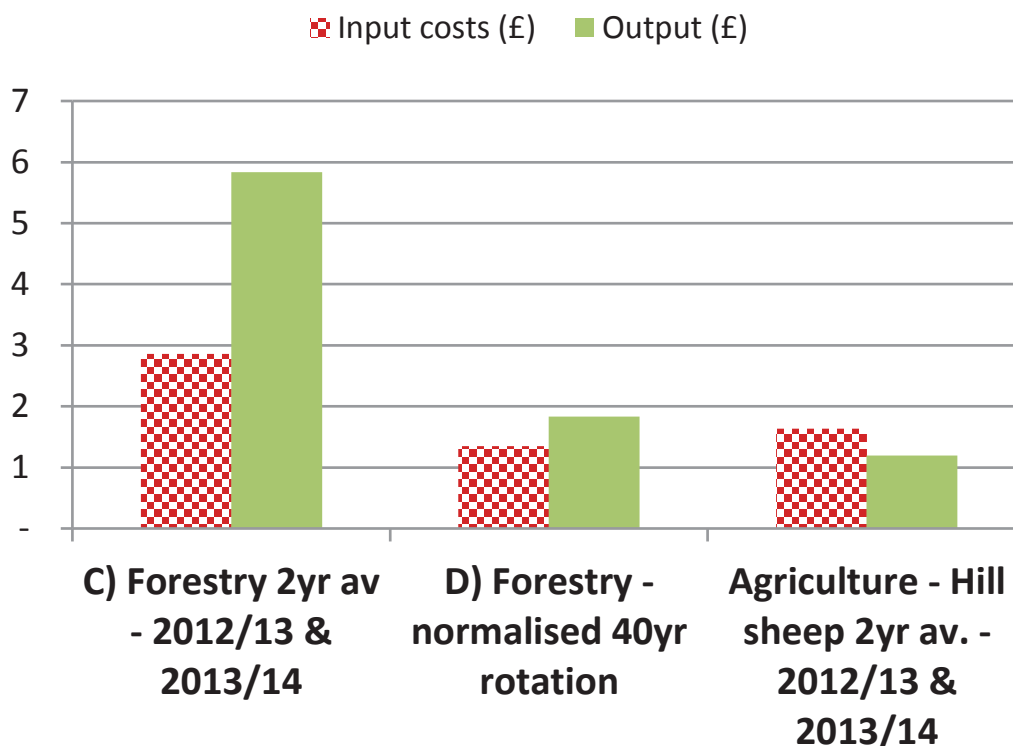
Financial results from the survey of forest managers in Wales were then compared with those produced by hill sheep farms as recorded in the Farm Business Survey for Wales (see chart 2 below).

These results indicate that on average over the two year period 2012/13 & 2013/14 forestry generated output before subsidy of £5.83m which is almost five times (4.9) that generated by agriculture of £1.2m on average in the same two year period. In the future, once timber output settles at a lower and more consistent normalised rotation, forestry is expected to generate one and half times the economic output of current hill sheep farming before subsidy payments.

Forestry also generated £3.3m of spending in the economy on average over the two year period 2012/13 & 2013/14; double that of agriculture. Forestry spending will in future settle down under a normalised 40 year rotation at around 90% that of current agriculture.

For full results see Appendix 4.

**Chart 2 – Equivalent financial input and output of agriculture and forestry (excluding subsidy) on 4,000ha of Welsh hill land (£m)**



Source: Welsh Farm Business Survey, SAC Consulting and Aberystwyth University



## 5.0 Employment

### 5.1 Outline of the employment effects

Estimates of direct employment were obtained from surveys of farming and forestry activities on an area of hill land comparable to that recorded in the survey of forestry managers. From this estimates have been generated of the wider employment impacts of the two sectors on the land itself as well as indirectly in the economy.

### 5.2 Methodology

#### Direct employment

Estimates of direct employment in forestry on 4,000ha of land were obtained from the survey of forest managers and broken down by forest activity (restocking, establishment, harvesting etc.).

Estimates of direct employment in agriculture on an area of hill land equivalent to the 4,000ha under forestry were calculated by SAC Consulting. This was based on livestock numbers from the Farm Business Survey and labour requirements in hours per head of livestock from the EBLEX Stocktake report 2014.

#### Indirect employment

Employment multipliers were used to extrapolate the employment effects on the wider economy. These multipliers give an estimate of how many indirect jobs are generated by the creation of each direct job by sector. Relevant employment multipliers for each sector and activity were taken from the Input-Output tables<sup>3</sup> (Type II). The full details are given in Appendix 5.

**Table 9 – WALES survey - summary of employment effects of land use**

| Activity   | Area of activity (ha) per FTE | Area of activity (ha) | Direct employment (FTE) | Direct and indirect employment (FTE) |
|--|-------------------------------|-----------------------|-------------------------|--------------------------------------|
| <b>FORESTRY</b>                                      |                               |                       |                         |                                      |
| C) WALES forestry survey average 2012/13 and 2013/14 | 93                            | 4,000                 | 31.52                   | 43.23                                |
| D) WALES forestry survey - normalised 40 yr rotation | 175                           | 4,000                 | 16.45                   | 22.79                                |
| <b>AGRICULTURE</b>                                   |                               |                       |                         |                                      |
| Farm Business Survey for hill sheep farming          | 148                           | 4,000                 | 22.35                   | 27.04                                |

Source: SAC Consulting survey of forest managers, employment multipliers from *The Input-Output Tables for Wales 2007*,<sup>3</sup>

<sup>3</sup> *The Input-Output Tables for Wales 2007*, Welsh Economic Research Unit, 2010.

### 5.3 Results

This analysis illustrates that current forestry (Scenario C) is generating 41% more direct employment and 60% more total employment (direct and indirect) than agricultural use on an equivalent land area. These results reflect the higher physical and financial output of the forestry activity at present given the elevated timber felling and restocking activity occurring at this stage in the life cycle of the forest.

In the future, timber output and restocking activity will drop to a lower but more sustainable long term level as the forest approaches a 'normalised' 40 year rotation (Scenario D). Employment will drop to an estimated 84% of the level achieved by agriculture on an equivalent land area.

In reality forestry planting is concentrated on the poorer hill land where farming employment is expected to be lower than average. Well sited forestry is therefore expected to generate greater employment than agriculture when it is utilising the less productive land from an agricultural perspective. Further research on the impact of land quality on employment is recommended.

Forestry employment will be sustainable at a much lower level of public subsidy per employee estimated to be £4,541 per FTE for forestry compared to £21,895 per FTE for agriculture.

## Appendix 1: WALES forest survey expenditure

| Year   | Forest operation          | Total cost (£)   | Area (ha)        | Cost (£/ha)  | Cost (£/t) | Timber (t) | Timber (t/ha) |
|--|---------------------------|------------------|------------------|--------------|------------|------------|---------------|
| <b>A) 2012/13</b>                            | Restocking                | 151,864          | 112.8            | 1,346        |            |            |               |
|  | Establishment             | 183,284          | 315              | 581          |            |            |               |
|  | Deer and pest control     | 5,379            | 3,971            | 1            |            |            |               |
|  | Harvesting                | 981,871          | 186.84           | 5,255        | 11.76      | 83,480     | 446.8         |
|  | Haulage                   | 840,554          | 186.84           | 4,499        | 10.07      | 83,480     | 446.8         |
|  | Roading                   | 212,961          | 3,971            | 54           |            |            |               |
|  | Management & professional | 104,626          | 3,971            | 26           |            |            |               |
|  | <b>Total</b>              |                  | <b>2,480,539</b> | <b>3,971</b> |            |            |               |
| <b>B) 2013/14</b>                            | Restocking                | 281,757          | 176.2            | 1,599        |            |            |               |
|  | Establishment             | 103,617          | 373              | 278          |            |            |               |
|  | Deer and pest control     | 12,331           | 4,073            | 3            |            |            |               |
|  | Harvesting                | 1,628,188        | 386.59           | 4,212        | 9.95       | 163,637    | 423.3         |
|  | Haulage                   | 1,718,189        | 386.59           | 4,444        | 10.50      | 163,637    | 423.3         |
|  | Roading                   | 220,920          | 4,073            | 54           |            |            |               |
|  | Management & professional | 112,542          | 4,073            | 28           |            |            |               |
|  | <b>Total</b>              |                  | <b>4,077,543</b> | <b>4,073</b> |            |            |               |
| <b>C) 2 yr average 2012/13 &amp; 2013/14</b> | Restocking                | 216,810          | 145              | 1,500        |            |            |               |
|  | Establishment             | 143,450          | 344              | 417          |            |            |               |
|  | Deer and pest control     | 8,855            | 4,022            | 2            |            |            |               |
|  | Harvesting                | 1,305,030        | 287              | 4,552        | 10.56      | 123,559    | 435.0         |
|  | Haulage                   | 1,279,371        | 287              | 4,462        | 10.35      | 123,559    | 435.0         |
|  | Roading                   | 216,941          | 4,022            | 54           |            |            |               |
|  | Management & professional | 108,584          | 4,022            | 27           |            |            |               |
|  | <b>Total</b>              |                  | <b>3,279,041</b> | <b>4,022</b> |            |            |               |
| <b>D) Annual normalised 40 yr. rotation</b>  | Restocking                | 135,038          | 90               | 1,500        |            |            |               |
|  | Establishment             | 90,025           | 216              | 417          |            |            |               |
|  | Deer and pest control     | 8,807            | 4,000            | 2            |            |            |               |
|  | Harvesting                | 409,650          | 90               | 4,552        | 10.56      | 38,785     | 430.9         |
|  | Haulage                   | 401,595          | 90               | 4,462        | 10.35      | 38,785     | 430.9         |
|  | Roading                   | 215,754          | 4,000            | 54           |            |            |               |
|  | Management & professional | 107,990          | 4,000            | 27           |            |            |               |
|  | Notional land rental      | 128,000          | 4,000            | 32           |            |            |               |
| <b>Total</b>                                 |                           | <b>1,496,858</b> | <b>4,000</b>     |              |            |            |               |

Source: SAC Consulting survey of forest managers

## Appendix 2: Agricultural financial results

|  | 2009-10                            | 2010-11                            | 2011-12                            | 2012-13                            | 2013-14                            | Average - 5 year<br>2010 to 2014   | Average - 2 year<br>2013 & 14         |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------------------------------|
| Unit                                       | Hill area equivalent to<br>4,000ha | Hill area equivalent to<br>4,000ha | Hill area equivalent to<br>4,000ha | Hill area equivalent to<br>4,000ha | Hill area equivalent to<br>4,000ha | Hill area equivalent<br>to 4,000ha | Hill area<br>equivalent to<br>4,000ha |
| <b>FINANCIAL OUTPUT</b>                    | £                                  | £                                  | £                                  | £                                  | £                                  | £                                  | £                                     |
| Total Crops                                | 0                                  | 12,472                             | 11,663                             | 11,510                             | 16,403                             | 10,410                             | 14,000                                |
| Cattle                                     | 218,893                            | 157,378                            | 181,085                            | 232,161                            | 217,062                            | 201,316                            | 224,000                               |
| Sheep                                      | 814,559                            | 760,041                            | 998,130                            | 915,857                            | 812,952                            | 860,308                            | 864,000                               |
| Other income                               | 2,843                              | -3,523                             | 4,607                              | 3,237                              | 4,021                              | 2,237                              | 4,000                                 |
| Non farm income (misc)                     | 69,493                             | 60,425                             | 61,112                             | 77,903                             | 101,678                            | 74,122                             | 88,000                                |
| <b>Total Output (before<br/>subsidies)</b> | <b>1,105,788</b>                   | <b>986,792</b>                     | <b>1,256,597</b>                   | <b>1,240,669</b>                   | <b>1,152,116</b>                   | <b>1,148,392</b>                   | <b>1,196,000</b>                      |
| <b>Total Grants &amp; Subsidies</b>        | <b>813,974</b>                     | <b>678,566</b>                     | <b>676,306</b>                     | <b>581,351</b>                     | <b>602,339</b>                     | <b>670,507</b>                     | <b>592,000</b>                        |
| Of which:                                  |                                    |                                    |                                    |                                    |                                    |                                    |                                       |
| Single Farm Payment                        | 606,474                            | 488,410                            | 483,952                            | 440,437                            | 446,066                            | 493,068                            | 444,000                               |
| Other                                      | 207,501                            | 190,155                            | 192,354                            | 140,914                            | 156,273                            | 177,439                            | 148,000                               |
| <b>Total Inputs</b>                        | <b>1,418,492</b>                   | <b>1,376,248</b>                   | <b>1,449,179</b>                   | <b>1,593,212</b>                   | <b>1,676,977</b>                   | <b>1,502,822</b>                   | <b>1,634,000</b>                      |
| <b>Total Output</b>                        | <b>1,919,762</b>                   | <b>1,665,358</b>                   | <b>1,932,903</b>                   | <b>1,822,020</b>                   | <b>1,754,454</b>                   | <b>1,818,899</b>                   | <b>1,790,000</b>                      |
| <b>FARM BUSINESS INCOME:</b>               | <b>501,270</b>                     | <b>289,110</b>                     | <b>483,724</b>                     | <b>228,808</b>                     | <b>77,477</b>                      | <b>316,078</b>                     | <b>152,000</b>                        |
| ***Published***                            |                                    |                                    |                                    |                                    |                                    |                                    |                                       |

Source: Welsh Farm Business Survey, SAC Consulting and Aberystwyth University

## Appendix 3: Agricultural physical output

| <u>AGRICULTURAL PHYSICAL DATA</u>   | <u>Units</u> | <u>2-year average</u> |
|-------------------------------------|--------------|-----------------------|
| Area covered (Excl. common grazing) | (ha)         | 4,000                 |
| Number of farms                     | (nos)        | 5.8                   |
| Average size of farm                | (ha)         | 689                   |
| Area of Fodder                      | (ha)         | 9                     |
| Area of grass (excl. rough grazing) | (ha)         | 1,666                 |
| Area of sole right rough grazing)   | (ha)         | 1,880                 |
| Other land                          | (ha)         | 445                   |
| <br>                                |              |                       |
| Number of breeding sheep            | (hd)         | 14,872                |
| Number of other sheep               | (hd)         | 10,311                |
| Number of suckler cows              | (hd)         | 186                   |
| Number of other cattle              | (hd)         | 485                   |

*Source: 2012/13 & 2013/14 Welsh Farm Business Survey, SAC Consulting and Aberystwyth University*

## Appendix 4: WALES Survey - equivalent financial input and output of agriculture and forestry on 4,000ha of hill land in Wales

|   | Forestry<br>2012/13 | Forestry<br>2013/14 | Forestry -<br>2yr average    | Forestry -<br>normalised 40yr<br>rotation | Agriculture - hill<br>sheep  |
|---|---------------------|---------------------|------------------------------|---|------------------------------|
|   |                     |                     | 2yr av. 2012/13<br>& 2013/14 | Based on 2012/13 &<br>2013/14 data        | 2yr av. 2012/13 &<br>2013/14 |
| <i>Output of which:</i>                       |                     |                     |                              | <b>£ Total</b>                            | <b>£ Total</b>               |
| Timber output (£)                             | 3,897,683           | 7,773,161           | 5,835,422                    | 1,831,742                                 | 1,196,000                    |
| Agricultural output (£)                       |                     |                     |                              |   | 1,634,000                    |
| Less Input costs (£)                          | 2,480,539           | 4,077,543           | 3,279,041                    | 1,496,858                                 | 1,634,000                    |
| <b>Surplus/deficit before<br/>subsidy (£)</b> | <b>1,417,144</b>    | <b>3,695,618</b>    | <b>2,556,381</b>             | <b>334,884</b>                            | <b>-438,000</b>              |
| Grants and subsidies (£)                      | 93,573              | 114,598             | 104,086                      | 103,516                                   | 592,000                      |
|   |                     |                     |                              | <b>£ per ha</b>                           | <b>£ per ha</b>              |
| Timber output (£)                             | 981                 | 1,908               | 1,445                        | 458                                       | 299                          |
| Agricultural output (£)                       |                     |                     |                              |   | 299                          |
| Less Input costs                              | 625                 | 1,001               | 813                          | 374                                       | 409                          |
| <b>Surplus/deficit before<br/>subsidy</b>     | <b>357</b>          | <b>907</b>          | <b>632</b>                   | <b>84</b>                                 | <b>-110</b>                  |
| Grants and subsidies                          | 24                  | 28                  | 26                           | 26  | 148                          |

Source: SAC Consulting survey of forest managers and Farm Business Survey for Wales, Aberystwyth University

## Appendix 5: Employment estimates

### C) WALES forestry survey - employment - 4,022 ha - 2yr average of 2012/13 & 2013/14

| Activity                       | Area (ha) of activity per FTE | Area (ha) of activity | Direct employment (FTE) | Employment multiplier# | Industry* | Direct and indirect employment (FTE) |
|--------------------------------|-------------------------------|-----------------------|-------------------------|------------------------|-----------|--------------------------------------|
| Restocking                     | 62                            | 145                   | 2.35                    | 1.21                   | 1         | 2.85                                 |
| Establishment                  | 149                           | 344                   | 2.30                    | 1.21                   | 1         | 2.78                                 |
| Deer and pest control          | 8,592                         | 4,022                 | 0.47                    | 1.21                   | 1         | 0.57                                 |
| Harvesting                     | 27                            | 287                   | 10.70                   | 1.21                   | 1         | 12.95                                |
| Haulage                        | 33                            | 287                   | 8.65                    | 1.58                   | 19        | 13.66                                |
| Roading                        | 701                           | 4,022                 | 5.74                    | 1.49                   | 1         | 8.55                                 |
| Management, professional (FTE) | 3,056                         | 4,022                 | 1.32                    | 1.43                   | 21        | 1.88                                 |
| <b>TOTAL (FTE)</b>             | <b>422</b>                    | <b>4,022</b>          | <b>31.52</b>            |                        |           | <b>43.23</b>                         |

Source: SAC Consulting - Confor survey

### D) WALES forestry survey - employment - normalised 4,000ha - 40yr rotation

| Activity                       | Area (ha) of activity per FTE | Area (ha) of activity | Direct employment (FTE) | Employment multiplier# | Industry* | Direct and indirect employment (FTE) |
|--------------------------------|-------------------------------|-----------------------|-------------------------|------------------------|-----------|--------------------------------------|
| Restocking (FTE)               | 62                            | 90                    | 1.46                    | 1.21                   | 1         | 1.77                                 |
| Establishment (FTE)            | 149                           | 216                   | 1.44                    | 1.21                   | 1         | 1.75                                 |
| Deer and pest control (        | 8,592                         | 4,000                 | 0.47                    | 1.21                   | 1         | 0.56                                 |
| Harvesting (FTE)               | 27                            | 90                    | 3.36                    | 1.21                   | 1         | 4.06                                 |
| Haulage (FTE)                  | 33                            | 90                    | 2.71                    | 1.58                   | 19        | 4.28                                 |
| Roading (FTE)                  | 701                           | 4,000                 | 5.70                    | 1.49                   | 1         | 8.50                                 |
| Management, professional (FTE) | 3,056                         | 4,000                 | 1.31                    | 1.43                   | 21        | 1.87                                 |
| <b>TOTAL (FTE)</b>             | <b>422</b>                    | <b>4,000</b>          | <b>16.45</b>            |                        |           | <b>22.79</b>                         |

Source: SAC Consulting - Confor survey

### Agriculture - employment - 2yr average - 2012/13 & 2013/14 Farm Business Survey for Hill sheep farming on 4,000ha of hill land

|                     | Average farm size (ha) | Nos of farms per 4,000ha | Average nos of FTE per farm | Employment multiplier# | Industry* | Direct and indirect employment (FTE) |
|---------------------|------------------------|--------------------------|-----------------------------|------------------------|-----------|--------------------------------------|
| Agriculture         | 689                    | 5.81                     | 3.85                        |                        |           |                                      |
| <b>Direct (FTE)</b> |                        |                          | <b>22.35</b>                | 1.21                   | 1         | <b>27.04</b>                         |

Source: Scottish Government Farm Accounts Scheme (FAS)

#### Notes

FTE = Full Time Equivalent; 1,900 hrs pa

Note - # Type II employment multipliers from "The Input - Output Tables for Wales, 2007", Welsh Economy Research Unit, (2010)

\*Industry; 1 - Agriculture, Forestry & fishing, 19 Haulage, 21 Other professional Services

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June 2015

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