

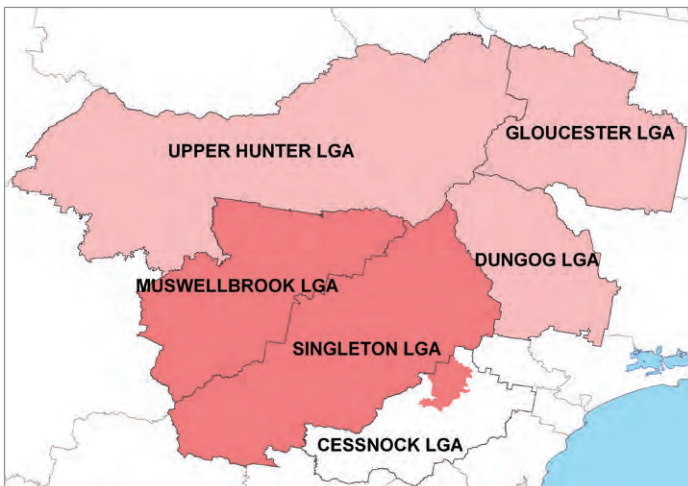
Upper Hunter Region Hay and Hemp Profile

FACTSHEET NO.7

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This profile identifies important hay and hemp resources, critical agricultural industry features, their potential development and related land use planning issues across the Upper Hunter region as shown in Figure 1.

Figure 1 – Upper Hunter region and study area (in orange) covered by this profile



Introduction

The Department of Primary Industries (DPI) is developing a consistent method for mapping important agricultural lands to support strategic planning by local governments and industry.

Important Agricultural Land maps identify lands that are highly suitable for agricultural industries at a local and regional scale.

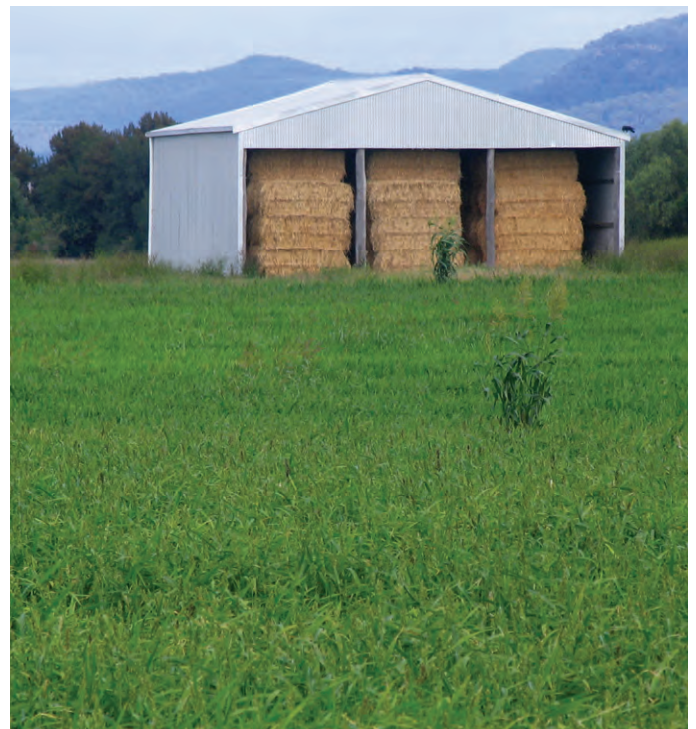
They complement the state significant agricultural lands mapping developed for Strategic Regional Land Use Plans (Department of Planning & Infrastructure).

A case study approach was adopted to identify the important agricultural lands for a range of agricultural industries within six

local government areas (LGAs). Orange, Cabonne, Blayney and Forbes in the central west; and Singleton and Muswellbrook in the Upper Hunter study area. Those areas were chosen to cover a wide variety of agricultural landscapes and industries.

Figure 6 identifies the important hay and hemp production lands in the study area incorporating Singleton and Muswellbrook LGAs. This profile also identifies the critical industry features and land use planning issues that are shared by each LGA in the broader Upper Hunter region that additionally includes Gloucester, Dungog and Upper Hunter LGAs.

Figure 2 - Hay storage and production areas near Denman (photo G Briggs)



Production highlights

Many crops and pasture types can be cut for hay, but the most prevalent is lucerne hay. As a long lived legume that can produce high-quality livestock feed, lucerne is the most important form of hay in the region. It is particularly valued by the equine and dairy industries and can be used to fatten or sustain beef cattle.

The production of industrial non THC (Tetrahydrocannabinoids) hemp is a small, emerging industry that commenced licensed production in 2009. The primary hemp product is the high value oil used in the manufacture of diverse pharmaceuticals (eg as an additive to paint, plastics, beauty products and food). The soft inner core (herd) of the stalks is used as; a fabric, building construction material, insulation, erosion preventive mulch and animal bedding.

Hay and hemp are well suited for growing in rotation on the same sites and require the same equipment and management to sow and grow. The Upper Hunter region provides important production and marketing advantages for lucerne hay and for hemp.

The temperate climate of the Upper Hunter region combined with reliable water supplies (but not excessive summer rainfall) and the extensive alluvial soils that can be trafficked or cultivated soon after rain allows five to seven cuts of lucerne to be consistently achieved each summer.

As bulky commodities, hay and hemp production additionally benefit from being close to markets. This includes equine studs and dairy farms, coal mines and potentially poultry farms.

Economic contribution

Hay

Hay making, particularly lucerne hay has featured in the Hunter region since the early 1800's and remains one of top five agricultural industries in the region. Hay growing occurs in all 5 local government areas, but it is a significant commodity in the Muswellbrook, Singleton and Upper Hunter LGAs.

The ABS no longer produces separate data on lucerne hay production, the estimated value of all pastures cut for hay in the Upper Hunter region is \$11.5 m (see table 1). This is based on the average NSW wholesale price for generic pasture hay and excludes the higher prices that local growers can receive from:

- producing feed quality lucerne hay for beef and dairy cattle and recreational horses;
- producing premium quality lucerne hay specifically for horses studs; and
- selling direct to dairy farmers and hobby farms.

ABS data identified that in 2005-06, a total of 490 Upper Hunter growers produced 57,851 tonnes of pastures cut for hay. This equates to 3% of the NSW total yield.

Hay production in the region is undertaken on a modest scale with a regional average of 20 ha of pasture cut for hay per farm (see Table 1). This is 50% smaller than the state average of 38ha of hay per farm.

However, the average annual yields in the Upper Hunter region are 150% larger than the state average (see table 1). This may reflect a favourable climate, reliable access to water and high soil fertility.

Fully irrigated lucerne in the Hunter region yields an average of 2.5 tonne/ha each cut and with 5 to 7 cuts between early October and late April ranging from 12 to 18 t/ha (Griffiths 2012).

The average yields for pastures cut for hay in NSW reported by ABS statistics (4 to 7 tonne/ha) as listed in Table 1 reflects a number of confounding factors. The ABS data combines lucerne with other lower yielding hay crops. It also groups dry and irrigated hay production together and includes farms that may only cut one crop of hay in a season before allowing livestock to direct graze on rotation.

Table 1, Upper Hunter Pastures cut for hay ABS 2006 *

Local Government Area	No. of Farms	Estim. wholesale value of hay* (\$ mill)	Ave annual Yield (tonnes/ha)	Employment*
Dungog	64	\$0.7	5	5
Gloucester	63	\$0.7	5	5
Muswellbrook	105	\$4.0	7	16
Singleton	130	\$2.8	6	31
Upper Hunter	128	\$3.3	6	29
Upper Hunter	490	\$12	6	88
NSW	11,822	\$355	4	967
UH as % of NSW	4%	3%	150%	9%

*changes may have occurred since this data was collected.

ABS data estimates the wholesale value of unprocessed agricultural products. These figures do not capture the flow on contribution of agriculture to other businesses in NSW. An estimate of the sector's contribution to the NSW economy, as presented in Table 1, is obtained by multiplying the wholesale value of agriculture by the standard ABS multiplier for agriculture production which is 2.178 (I&I 2011).

An indication of the overall contribution of agricultural jobs to NSW employment was similarly obtained by multiplying employment in the particular industry sector (other crops) by the standard ABS multiplier for agricultural employment of 1.828 (I&I NSW 2011)

Hemp

The production of low TCH hemp under license in NSW was legalised in late 2009, and is still relatively low scale.

Currently available ABS agricultural statistics do not identify hemp production. Hemp growers, however must be licensed. Unpublished NSW DPI records (Blackmore pers comm.) identify that there were 7 hemp growers in the Upper Hunter region in 2011.

Based on average regional yields of 10 tonnes/ha, (Muir pers comm.) an estimated total of 480 tonnes of hemp fibre was produced in the region in 2011. This represents 87% of the statewide production (see Table 2).

Table 2, Upper Hunter Hemp production, 2011 data*

Local Government Area	No. of Farms	Area	Ave Yield tonnes /ha	Estim. Yield tonnes
Muswellbrook	4	27	10	270
Singleton	3	21	10	210
Upper Hunter	7	48	10	480
NSW	11	80	7	552
UH as % of NSW	64%	60%	140%	87%

* Based on industry and DPI data

Interest in industrial hemp has gained momentum world wide. The market for natural fibres is expected to increase in response to the growing demand for biodegradable and natural products (NSW DPI 2008).

Reliable data on the profitability is currently unavailable. However, if total stem yields are conservatively assumed at 10 t/ha (dry weight basis) and priced at approximately \$245/t, this equates to \$2,450/ha (NSW DPI 2008). This provides scope for industrial hemp to compete with other broadacre summer crops, once infrastructure is established.

Hemp is bulky commodity and requires specialist processing. The construction of a pilot hemp processing plant in NSW at Jerry's Plains near Singleton in 2011 was consequently a major step in the development of this industry. The processor expected that from 2012 almost all NSW hemp will grown within 50kms of that plant.

Figure 3 - Inspecting a mature Upper Hunter hemp crop. Photo Neil Griffiths



The concentration of production in the Upper Hunter region is also encouraged by the high yields possible due to reliable water supplies and experienced growers. The average of 10 tonnes/ ha of hemp produced in the Upper Hunter region is 87% higher than the NSW average (see Table 2). The high returns for hemp also make it suitable for modest farm sizes.

The average wholesale value of hemp in 2011 was \$180 per tonne (Muir pers comm.) and by including multipliers, the regional value of the Upper Hunter region 2011 hemp production was approximately \$0.2 million.

The industry has a 5 year target of 12,000 tonnes / year, and at the current average prices this would equate to approximately \$2.2million.

Industry challenges

Lucerne hay quality depends on the stage of growth when cut, the ratio of leaf to stem, the haymaking technique, the proportion of weeds, the extent of weather damage, and the presence of mould (DPI 2003). Management expertise, growth rates and the timely availability of labour and machinery are consequently critical.

Non-THC Hemp is produced under strict licence requirements. It also requires specialist expertise, harvesting equipment and processing facilities. A minimum of 20 ha suitable for hemp production is required to justify specialist contract harvesting equipment and industry support services. A critical mass (cluster) of growers is also necessary to support commercial processing facilities in the region.

Hay production around 1,000 tonnes per year (ie a minimum of 50 plantable hectares) is generally required to cover the costs of owning efficient modern hay making equipment and ensure access to specialist markets.

Smaller operators with only 10 to 20 ha can also be competitive if they have low overheads and continue to use older available equipment to produce small traditional baled hay for niche markets.

Sustainable hay production and the development of a sustainable hemp industry in the Upper Hunter region, however, are both challenged by competing land uses, increasing land use conflict risks and competition for water.

Alluvial lands adjoining the Hunter River that are highly suited to lucerne and hemp production are also attractive to residential and rural lifestyle development. Coal resources also underlie alluvial lands in the Hunter, and suitable hay production lands are often included within mining buffer areas.

Fragmented land use patterns and dispersed residential development require growers to sterilise suitable lands as a buffer in order to avoid potential impacts with nearby residents on small lots. Producers may also have to adopt suboptimal management practices such as restricting the night time use of irrigation equipment and machinery.

Hay and hemp production are intensive forms of agriculture. Chemicals are typically required to control weeds, diseases and pests. Cultivation and harvesting creates noise and dust impacts. Hay production also requires night time machinery operation during summer.

Mining and Coal seam gas exploration in the region and the short term lease tenure of land owned by mining companies adds to the uncertainty for hay and hemp producers. This can limit further investment. It also raises concerns about cumulative impacts on:

- the quality, availability and price for water;
- the availability of skilled labour including machinery operators on farms, mechanics, aerial spraying and harvesting contractors;

- the critical mass of hay and hemp growers due to competing land uses and investment uncertainty; and
- the equine and dairy industry both of which are important hay markets.

Growers are also concerned that mine blasting impacts may damage older irrigation mains and subsidence impacts from long wall mining. Lucerne and hemp production both require the creation of a highly tilled seed bed and highly uniform, level surfaces that do not pool or channel water. Subsidence may affect irrigation efficiency and crop production uniformity.

Hemp growers are additionally concerned about the complexities and costs of licensing requirements. This includes concern about lost sowing opportunities if approvals are delayed and the difficulties of securing sites that are suitably isolated from rural residences. Another challenge is the capacity to rapidly gain sufficient industry mass to support a full scale processing plant and the development of ongoing markets.

Hay growers are additionally concerned about: fluctuating prices (affected by milk price wars and major incidents such as the Equine Influenza outbreak); and the lack of a hay growing association to promote improved production methods or efficiencies.

The development of mining in the region creates potential opportunities to develop lease arrangements that allow the aggregation of lucerne production leases into larger, cost effective parcels. Better lease arrangements or cooperative ventures might also support investment in new irrigation equipment, regional processing facilities or a grower association.

Climate change

Identified climate change impacts affecting hay and hemp production in the Upper Hunter region primarily focus on the increased risk of summer storms, more variable temperature ranges and higher humidity. Such impacts can increase disease and pest outbreaks and contribute to delayed harvests and the downgrading of hay quality that can also reduce the profitability of haymaking.

The longevity of the perennial lucerne hay crops, their drought tolerance and the regions relatively reliable irrigation sources provides important buffer capacity against unseasonal conditions.

Upper Hunter region producers are additionally experienced at adapting to the already highly variable climate. Hence they are well situated to adapt to a changing climate.

Climate change policies are also expected to increase the costs of power for irrigating. The cost of water may also increase if rainfall declines and competition for water increases (eg from additional mines). This will increase the pressure for more cost effective and efficient production.

The capacity for local producers to grow a high value hemp crop in conjunction with lucerne as part of the required 1 in 5 year rotation provides a potentially valuable opportunity to adapt to climate change and to increased costs.

Infrastructure requirements

The Hunter benefits from relatively high annual rainfall and low evaporation rates. This allows hay production to occur on a seasonal basis in almost every valley with alluvial soils and ground water. Supplementary irrigation, however, supports faster more reliable growth rates and higher yields and is essential for hemp production.

Hence the most critical infrastructure for hay and hemp growing is access to the Hunter River's high quality, regulated water sources.

Other important infrastructure needs are:

- efficient farm irrigation systems
- reliable electricity supply for irrigation pumps;
- hay storage facilities
- good roads for hay transport and sales; and
- access to a local processing plant for hemp (ideally within 50km)

Development prospects

The arrival of the destructive exotic lucerne aphids in 1977 and a shift from pastures to cropping resulted in a statewide decline in lucerne production (NSW DPI, 2003).

Improved varieties of lucerne and management practices largely overcame the aphid problem and provided the added production benefits. Improved hay-making techniques, droughts and renewed interest in livestock production also increased the profitability of lucerne production and renewed development prospects (NSW DPI 2003).

In the Upper Hunter region competing residential and mineral developments remain a barrier to increased hay production, but the region also has significant competitive advantages.

The unique geography of the Hunter Valley allows maritime influences to extend much further inland than other coastal catchments. The resultant milder temperatures, year round rainfall and relatively low evaporation rates provides an extended growing season and relatively high yields.

The Upper Hunter region also provides an ideal balance between the higher rainfall and humidity of the lower Hunter and the drier, hotter inland areas.

Importantly the Upper Hunter region also provides an expanding market for lucerne sale to equine studs. Being able to produce a low density bulky commodity in close proximity to key market outlets is a major competitive advantage.

Figure 4 - Irrigated Lucerne on alluvial lands near Jerrys Plains (photo G Briggs)



Important Hay & Hemp lands

Lucerne and hemp grow best on deep, well-drained soils, with a pH of 5.2 to 7.5 and medium to light texture (friable) soils suitable for regular cropping. Reliable, low salinity water supplies are also important. Typical rainfalls allow lucerne and hemp to be grown without irrigation (dryland cropping). Supplementary irrigation, however, provides more consistent crop establishment and higher yields, especially during drier periods.

The most important hay production areas are consequently the alluvial lands that adjoin the Hunter regulated river. The calcium rich alluvial soils of the Upper Hunter region are ideal.

The most highly suitable lands for growing hay and hemp additionally have a slope of not more than 2 degrees. This minimises the erosion risks and ensures even watering.

Although healthy, established lucerne can survive 2 to 3 days of flooding in winter, waterlogging usually kills lucerne plants, particularly when temperatures are high. Higher flood risk areas and uneven or poorly drained lands consequently present a greater risk of failure and lower overall yields.

Hay and hemp growing also require adjoining higher (relatively flood free) lands on which to locate critical infrastructure such as machinery and storage sheds.

Important Hay and Hemp lands in the Upper Hunter feature:

- reliable access to water via rainfall and/or irrigation options (within 2 kms of the Hunter River or associated alluviums);
- well drained, fertile soils suitable for regular cultivation, typically alluvial loams (Land and Soil Capability Classes 1- 4 with less than 2 degree slopes and Moderately Low – High soil fertility);
- temperate climate - moderate frost risk, mild summers (< 750 mm rainfall);
- access to regional markets for hay (eg equine & dairy farms) or within 50kms of a processing plant for hemp; and
- a critical industry mass to support contractors & specialised equipment (at least 10 ha of contiguous suitable lands).

Figure 6 shows the locations that are highly suited to hay and hemp production in Singleton and Muswellbrook LGAs and part of Cessnock LGA (the study area).

These lands are also important for other agricultural uses such as dairying, beef cattle, horses and horticulture. This diversity highlights their importance for future food security and for climate change adaptation.

Land use planning implications

The very specific requirements for successful lucerne hay and hemp growing only occur in very limited and very specific locations.

Hay and hemp growing is additionally a long term investment that requires capital investment in irrigation equipment, regular rotation and long term weed and pest control. Land use surety and the compatible development of surrounding lands are critical.

Critical industry mass and minimum production levels are also needed to ensure competitive, efficient hay and hemp production. Isolated, smaller properties find it increasingly difficult to avoid land use conflicts and to secure the more profitable returns that are possible from consistent high quality lucerne production and from contracts for direct supply to major studs.

Landuse planning can retain sustainable local hay production establishments and promote the sustainable growth of the fledgling industrial hemp industry via strategic studies and planning instruments that:

- identify lands that are highly suitable for hay and hemp production (see figure 2) and zoning these as either RU1 or RU4;
- adopting relevant minimum lot sizes; and
- ensuring compatible development in important hay and hemp growing areas.

Residential, rural lifestyle and mining developments should be strategically planned for in locations other than the highly productive alluvial lands that hay and hemp production (and many other agricultural industries) depend on.

A minimum lot size of 40 ha is recommended for important hay growing lands in the Upper Hunter region. In addition to a suitable plantable area of at least 10 to 20 ha, the property also needs to have sufficient lands for farm infrastructure and provide necessary set backs from drainage lines and houses on adjoining lots.

Potential conflicts include; dust generated by cultivation; spraying for weed, disease or pest control; essential night time hay making operations; and slow moving farm vehicles on local roads.

Land use conflicts can be minimised by good industry practice and by developing relevant Development Control Plan guidelines for Primary Production areas in consultation with farmers. Possible provisions include; adequate set backs and landscaping requirements for new houses.

Although hay and hemp production are defined in the standard Local Environment Plan (LEP) as broadacre fodder crops and hence are defined as Extensive Agriculture, the paired NSW DPI guidelines; Preparing intensive plant agriculture development applications and Assessing intensive plant agriculture development contain advice that may also be relevant to lucerne and hemp development proposals.

Acknowledgements

This profile was produced in consultation with government, industry and community stakeholders and based on available statistical and spatial data and industry intelligence.

July and December 2011 workshops for local farmers and stakeholders, tested important agricultural mapping outcomes and confirmed industry development issues and opportunities.

Written by Glenda Briggs and reviewed by Neil Griffiths (NSW DPI), Wendy Goodburn and Jennifer Warner (NSW DPI Resources Planning and Development team).

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References

ABS (Australian Bureau of Statistics) 2006a, Catalogue 7125.0 - Agricultural Commodities: Small Area Data, Australia 2005-06 accessed from <http://www.abs.gov.au/ausstats/abs@.nsf/Products/7125.0~2005-06+%28Reissue%29~Main+Features~New+South+Wales?OpenDocument>

ABS (Australian Bureau of Statistics) 2006b, NSW population census.

Blackmore, Philip pers comm. 2011

Department of Primary Industries

I&I NSW (Industry & Investment NSW) 2011, Contribution of Primary Industries to NSW Economy, DPI 2011 – agricultural contribution and standard agricultural multipliers, accessed from <http://intranet.dpi.nsw.gov.au/library/statistics/industry/all-industries/key-data-2011.pdf>

Muir, John pers comm. Sept 2011

Ecofibre Industries Operations Pty Ltd

NSW Ag. 2003, Lucerne for Pasture and Fodder, Agfact P2.2.25 accessed at: http://www.dpi.nsw.gov.au/___data/assets/pdf_file/0010/164737/p2225-pt1.pdf

NSW DPI (Department of Primary Industries) 2008, Industrial hemp - a new crop for NSW, Primefact 2008, <http://www.dpi.nsw.gov.au/agriculture/broadacre/summer-crops/fibres/hemp/industrial-hemp>

Additional reading

Preparing Intensive Plant Agriculture development applications, DPI 2011 accessible at; <http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment/plant-apps>

Assessing Intensive Plant Agriculture Developments, DP 2011 accessible at; <http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment/plant-devs>

Land Use Conflict Risk Assessment Guide, NSW DPI 2011 accessible at <http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment/lucra>

Land Use Planning and Development
<http://www.dpi.nsw.gov.au/environment/landuse-planning>

Other agricultural land use planning and development guidelines are accessible at: <http://www.dpi.nsw.gov.au/agriculture/resources/lup>

Crops for Hunter Project, Upper Hunter Shire Council assessable at:

http://upperhunter.local-e.nsw.gov.au/index.php?option=com_jentlacontent&view=category&layout=blog&id=1807&Itemid=2308

Opportunities to engage in commercial low THC hemp fibre and seed production in NSW, DPI website: <http://www.dpi.nsw.gov.au/agriculture/broadacre/summer-crops/fibres/hemp/commercial-production>

Growing low THC hemp under licence in NSW - Frequently asked questions, DPI 2012 <http://www.dpi.nsw.gov.au/agriculture/broadacre/summer-crops/fibres/hemp/faq>

Producing Quality Lucerne Hay; DPI 2008 www.dpi.nsw.gov.au/aboutus/resources/bookshop/producing-quality-lucerne-hay

A practical guide for producers, also includes best management practices.

Silage and Hay, Field Crops, Pastures and Rangelands; <http://www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/silage>

Strategic Regional Land Use Policy

<http://www.nsw.gov.au/strategicregionallanduse>

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