what the market wants

chapter 3

credit: Emma Leonard, AgriKnowHow

There are two key markets for hay - domestic and export (Figure 3.1). Each has its own specific requirements. Speak to your hay processor or buyer before selecting varieties and equipment to ensure the hay you produce meets the market's needs.

The high quality standards demanded by the export hay market have substantially boosted the domestic demand for quality oat hay by dairies and feedlots. This has resulted in very similar quality requirements for the export and domestic oat hay markets (Table 3.1).

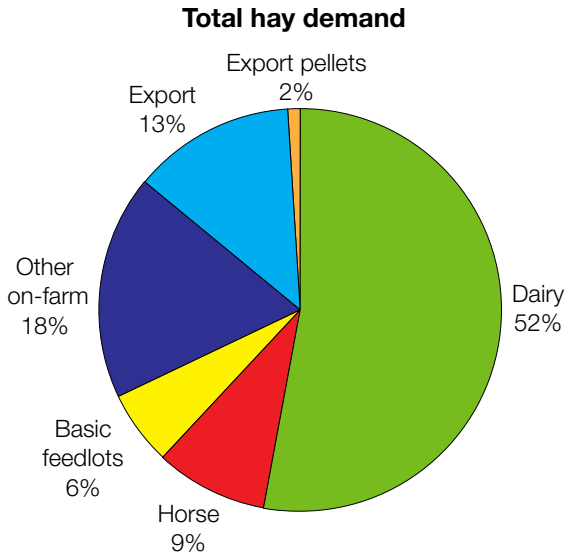

Figure 3.1 Australian fodder industry by market based on several years of data – *source AFIA 2016.*

Requirements for bale size can vary between domestic markets (Table 3.2). Large square bales or high density bales are increasingly required by exporters. These are often repacked into high density small bales. On page 23 the photograph shows a 23kg bales and 24 by 23kg bales shrink wrapped for shipping.

Table 3.1 An example of hay quality parameters for export cereal hay – *source Gilmac 2016.*
Annual quality requirements for domestic hay may depend on the price of alternate ingredients used in livestock rations.

Quality parameters	Export cereal hay
	Level
Dry matter (DM)	>85%
Crude protein (CP)	4-10%
Neutral detergent fibre (NDF)	<57%
Acid detergent fibre (ADF)	<32%
Dry matter digestibility (DMD)	> 58%
Metabolisable energy (ME)	>9.5Mj/kg DM
Water soluble carbohydrates (WSC)	>18%
Nitrate (NO_2)	<500ppm

Objective and subjective tests for hay quality

Intake and preference

Hay nutritive value and feeding value should not be confused. Nutritive value is determined by digestibility and efficiency of utilisation of nutrients. Feeding value is

determined by a combination of nutritive value and how much an animal consumes (voluntary feed intake).

Hays of similar nutritive value can differ in feeding value. In general, voluntary feed intake for hay with thinner, less fibrous stems is greater than for hay with thicker, tougher stems.

Feed analysis

The feed analysis measures dry matter, digestibility, fibre and water soluble carbohydrate content, as well as crude protein and nitrate nitrogen levels (Table 3.1). For export hay, the feed analysis is generally organised by the hay buyer.

Moisture

Moisture is generally measured in the paddock or on the baler by the grower. Most exporters specify maximum bale moisture of 14% at delivery to ensure hay does not degrade or spoil during storage. High moisture hay for the export market will be rejected at delivery (see Chapter 8 – testing moisture content). Dry matter, the inverse of moisture content, is reported on the feed analysis.

Fibre and digestibility

Fibre is required by ruminants to maintain rumen function. It is also essential in the production of milk fat. Acid detergent fibre (ADF) represents the most indigestible fraction of the hay. As ADF increases, the digestibility of the forage decreases.

The neutral detergent fibre (NDF) value reflects the amount of forage the animal can consume. As NDF percent increases, dry matter intake generally decreases.

Digestibility estimates the percentage of forage that can be readily broken down in the rumen.

Water soluble carbohydrates

These are sugars that are rapidly fermented in the rumen and the products of this fermentation are mainly precursors for protein synthesis. High quality oat hay will have a water soluble carbohydrate content of about 19%. Water soluble carbohydrates, in particular fructose, influence palatability but may not be strongly correlated with preference.

Minerals

Oat hay is generally low in sodium, but potassium and nitrate levels can vary depending on crop nutrition and availability in the soil. If dry cows are fed hay with a potassium level in excess of 2%, within three weeks of calving, the potential risk of milk fever is increased. This risk is influenced by the level of sodium, chloride and sulphur in the total diet.

Many of the above factors can be manipulated by variety choice crop agronomy and by the way hay is made and stored (Table 4.4).

Feed intake for hay with thinner, less fibrous stems is greater than for hay with thicker, tougher stems. Left to right, premium quality export hay with increasing stem diameter.

credit Emma Leonard, AgriKnowHow

Export markets

The export market for oat hay continues to dominate hay and straw exports (Figure 3.2). Demand from China is starting to accelerate, while the markets in Japan, Korea and Taiwan have remained strong (Figure 3.3). Indonesia and Vietnam are seen as developing markets for export oat hay.

In the financial year 2014-15, Japan remained Australia's largest and most important customer (Figure 3.3). In this period, exports of cereal hay and chaff to Japan represented about 60% of exports in this category of products.

Stable hay quality and lack of contamination underpin the favourable reputation of Australian hays in export markets.

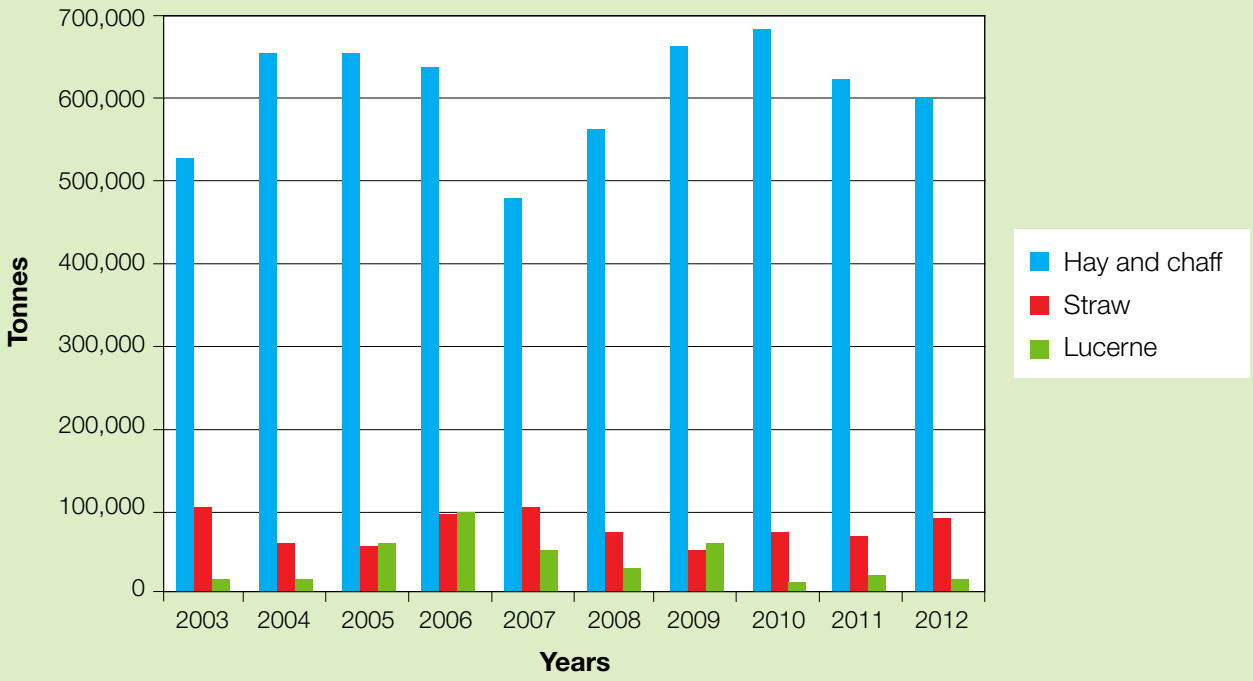

Figure 3.2 Australian cereal hay and straw exports 2003 to 2012 (tonnes) – *source ABARE.*

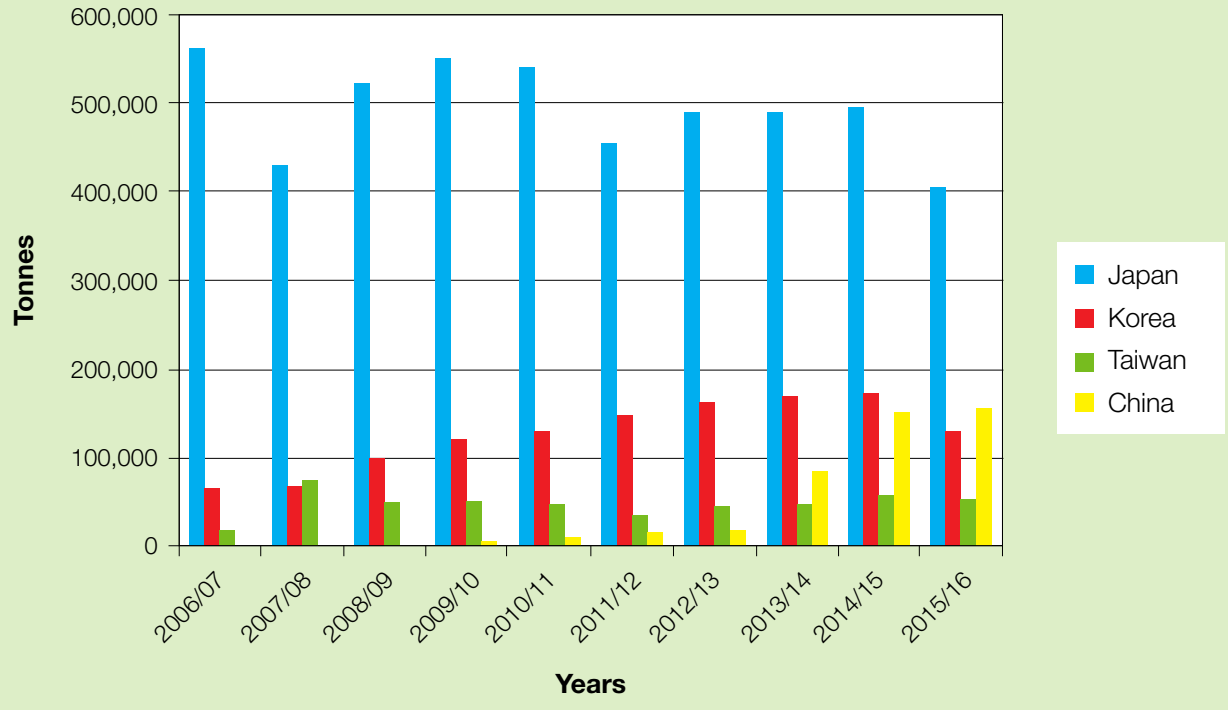

Figure 3.3 Australian cereal hay exports by key markets 2006 to 2016 – *source ABARE.*

The markets in Japan, Korea, and Taiwan, and the emerging markets in Vietnam and Indonesia have several common factors that drive the importation of high quality forage. These factors are:

- large populations, of which many have a substantial disposable income;
- insufficient land to produce enough quality feed to meet demand;
- governments that wish to increase the level of self sufficiency in dairy and meat production.

While China does not lack productive land, it is influenced by the other two factors and currently is importing large quantities of high quality fodder to supply its rapidly expanding dairy industry.

At the time of writing, the USA and Canada are Australia's main competitors in the export hay market. These countries produce premium hay products from Timothy grass, alfalfa (lucerne) and Sudan grass.

From the perspective of the Australian producer, the export hay market and consequently hay price are driven by:

- supply from Australia and of competitive products from overseas;
- hay quality;
- the value of the Australian dollar on the exchange markets; and
- competition from the domestic market.

Japan

Japan is generally regarded as a mature market; very consistent and stable but with limited opportunities for growth. In recent years, there have been a number of challenges for Australian exporters in Japan including declining beef and dairy cow numbers and the devaluation of the Japanese yen.

Korea

Korea remains a good market for Australian hay that has both grown in value and provided an alternate market to Japan. This market has a strong focus on the dairy industry and typically takes lower priced, mid quality hay.

Taiwan

Taiwan is a mature and well educated market for Australian hay with preference for high quality hay, both oaten and wheaten, with high analysis results. Again, the key customer is the dairy industry.

China

China is emerging as an important potential market for the Australian export fodder industry. Small volumes of Australian fodder have been exported to China as far back as 1995, however, it was not until 2009 that the market started to evolve. Demand for fodder in China is being driven by growth in the demand for dairy products.

Chinese customs and Government requirements are strict and must be met. Failure to do so can result in an exporter being banned from the market; this is not an idle threat. Contamination in the hay is a major concern to Chinese authorities.

What is quality export hay?

Quality is imperative for export hay and is determined by a combination of factors:

- visual and sensory appearance;
- objective measurement, including feed analysis;
- product safety.

Hay buyers differ in their methods of quality determination and the importance they place on visual, sensory and objective assessment. It is important to understand what your buyer requires in terms of hay quality and how this is determined.

In a nutshell, the export market demands hay that:

- animals want to eat, even when their nutritional requirements have been met;
- is readily digested without excessive regurgitation as this takes energy and reduces intake;
- provides appropriate levels of nutrients for the animal to perform.

Why quality matters for all markets

Poor quality hay may be cheaper per tonne but hay quality has a significant impact on growth rate and milk production. This is clearly demonstrated in Table 3.2(a) and (b) which show the impact of hay quality on feed conversion and the economics of weight gain on a young 300kg steer only fed cereal hay.

Table 3.2 Cereal hay quality used in the example in (a) and (b) – *source Ian Sawyer, Feedworks.*

Hay type	Good	Moderate	Poor
ME (MJ/kg)	11	9.5	8.2
NDF%	40	50	65
ADF%	30	36	45
Price ($/t)	275	250	225
(b) Impact of hay quality on feed conversion efficiency			
Intake (kg DM/day)	9	7	5.5
Energy intake (MJ/day)	99	66	45
Growth rate (g/day)	1300	520	70
Days to gain 50kg	38	96	700
kg feed/kg gain	6.8	13	77
(c) Economics of weight gain on different quality hay			
Growth rate (g/day)	1300	520	70
Feed making meat (%)	56	31	3
Feed maintenance (%)	44	69	97
kg feed/kg gain	6.8	13	77
Feed cost (cents/kg)	27.5	25	22.5
Cost to gain 1kg ($)	1.87	3.25	17.32

Visual, sensory and safety assessments

Colour

The primary visual criterion is an appealing but not a vivid green colour. There is a perceived association of vivid green hay with high nitrate levels, which can result in nitrate poisoning.

There appears little evidence that animals prefer hay due to its colour but there may be aromatic compounds that have an influence.

Staining, moulds and dust

The main market inhibitors are yellow staining, brown leaf, high dust levels and the development of mould. Hay containing one or more of these will be downgraded.

Moulds can be smelt and buyers want to source sweet, clean smelling hay as offensive odours deter hay intake.

Stem diameter

Thin stems are preferred as these contain less fibre in the cell walls. Coarser stems are acceptable in total mixed rations.

In general, voluntary feed intake for hay with thinner, less fibrous stems is greater than for hay with thicker, tougher stems.

Impurities and foreign objects

The inclusion of certain weeds, including capeweed and Salvation Jane, can cause undesirable black patches in the bale, resulting in discolouration and downgrading.

Export markets have a nil tolerance for contamination with animal carcasses or faeces.

Hay must be free from foreign material, such as metal objects, glass, sticks and fencing wire that can injure farm animals, their handlers or equipment.

Toxins

The industry cannot afford livestock deaths due to ARGT or poisoning from other corynetoxins. Export hay markets demand hay free from the risk of toxicity and increasingly test for toxins or their precursors. Twelve bales per paddock or 15% of bales in every paddock, whichever is the greater, must be sampled for ARGT.

Hay must have chemical residues lower than Australian Maximum Residue Levels (MRL) as outlined by the Australian Pesticides and Veterinary Medicine Authority (APVMA), unless specified by the importing country. Speak to your hay buyer to ensure you can meet requirements.

Domestic hay markets

Customer demands, especially in the equine industry, change from year to year depending on the availability of forage and other feeds. Each sector differs in its demand for bale size and shape (Table 3.3), so it is important to understand your market.

The domestic market is loyal to suppliers who provide the right product, have continuity of supply throughout the year, can deliver on time and load without time constraints.

Table 3.3 Demand and requirements for hay by the domestic market.

Market	Demand	Quality required	Storage and handling
Dairy	Increased interest in oat hay due to improved hay quality. Dairy farmers are prepared to compete on price.	Low demand for pure oat hay. Meadow hay containing a mix of grasses, pasture legumes and oats is preferred. Hay that does not make export grade is acceptable but for milk production, export grades are required. Prefer hay with no grain. High energy sought for milk production. Green colour and thin stems are desired quality characters. Palatability is paramount. Rust and mould are not acceptable.	Wide variation in desired hay quality. Preference for round and large square bales. Buy as needed – lack of long term storage.
Feedlots	Some increased demand for oat hay as record numbers of animals held in feedlots. Maize and lucerne main competitors.	Fed to animals for growth and bulk. For cattle, hay price and quality are important. Cut at early milk stage; no grain, no vermin. For sheep feedlots, hay needs to be finely chopped and good quality.	Large square bales generally preferred. Oats may also be used as silage.
Horses	Varies from year to year depending on availability of pasture hay.	Free from dirt, dust, mould, and rust diseases. Fine stems and good colour. Customers are fussy and there is wide variation in desired quality: 1) no grain development to some grain. 2) minimal flag leaf to plenty of leaf. Generally, do not cut hay before milky dough. Horses seem to prefer unconditioned hay.	Preference is generally for hay to be in small square bales.
Hobby farmers	Low demand for pure oat hay. Meadow hay containing a mix of grasses, pasture legumes and oats is preferred.	Wide variation in desired hay quality.	Low density small bales preferred over large bales.