Acorns as valuable supplementary fodder for livestock: some observations.

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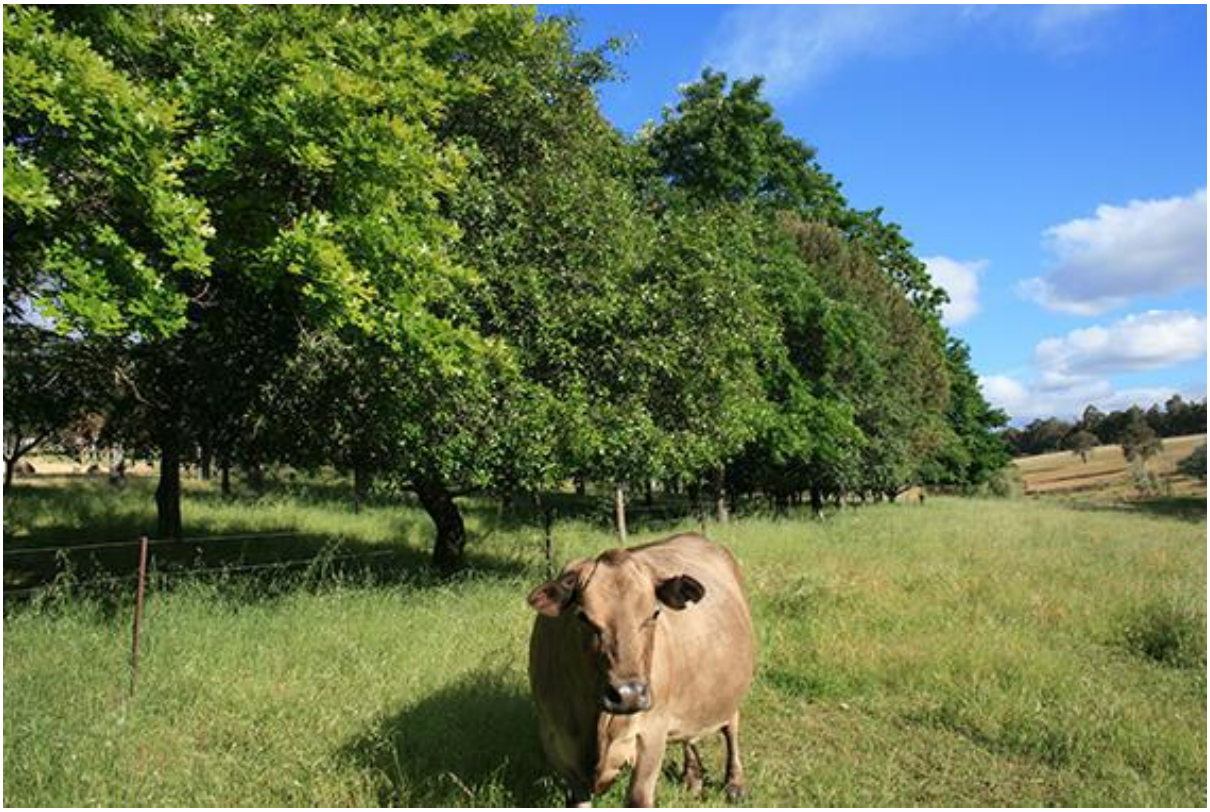


This shelterbelt of mixed Oaks at Small Tree Farm provides cattle with a cool summer haven and converts their manure into valuable autumn food reserve.

In our Mediterranean climate the usefulness of acorns in helping to sustain animals through the difficult times of the 'autumn feed gap' has been further emphasized during recent tough dry starts to the winter pasture growing season.

Mercifully, it was at least "raining" acorns while the annual pastures were producing little or nothing.

Having had, over some four decades, the great fortune of being able to plant a variety of oaks, watch them grow, and observe some of the acorn feeding habits of livestock and wildlife, I have become ever more convinced of the value of oaks as farm trees. Not only do they combine the deepest of shade

with the ability to cope with the manure deposited by camping stock, they can return that nutrient enrichment in bounds, using it to produce acorns which can act as a valuable high energy autumn feed supplement; one ‘that falls out of the blue sky’ just when animals need it most.

On top of that many oaks can act as fire retardants providing protection from wildfire.

The value of acorns lies largely in their energy content, with fats and carbohydrates together typically comprising about 60% of their weight, which is particularly useful at a time of year when livestock are low in reserves of body fat.

Acorns are also a helpful source of some of the vitamins and minerals that are likely to be in short supply in the sun-bleached remnants of annual pasture.

At 6 - 10%, protein levels are modest but helpful nonetheless.

Voting with their hooves: cattle introduced into a fresh paddock are at first more interested in acorns than hay.

(N.B. wanting some peace and quiet from impatient bellowing, and knowing their habits, I knew there would be plenty of time yet to finish getting the hay ready for them.)

But there are of course qualifications and considerations, and there is much to learn and I do not claim to be expert, but there are some observations I think are worth sharing, based on experience - both at Small Tree Farm, where our cattle have the opportunity to graze under some dozen varieties, and at Golden Valley Tree Park, where sheep have access to acorns from over thirty types.

Some specific acorn feeding patterns with cattle and sheep.

- Importantly, cattle with ad-lib access to both hay and acorns consumed hay at half of the rate than when they had ad-lib hay alone.

- When introduced into a new paddock where both fresh hay and acorns were available the cattle generally rushed to eat the acorns first.

- Both cattle and sheep would on occasion eagerly seek out acorns of one tree while ignoring those of its neighbour of the same species. (The difference between trees could perhaps be explained by a difference in the levels of bitter tasting tannins.)

- If feed remained short, hungry stock would eventually take to those acorns they had initially found less palatable. (It could be that tannin levels had fallen in the meantimeas the acorns lay exposed to the elements.)

- The animals seemed just as happy to eat acorns in the green unripe state which had fallen prematurely as they do mature ones.

- While sheep would ultimately tend to clean up all acorns, cattle would be less efficient, shunning - as they do in the case of pasture - those which have been fouled by urine and droppings.

Can Acorns be Poisonous?

Not in my experience. Poisoning is variously reported as being extremely rare at one end of the spectrum, to being absolutely pernicious at the other. The tannin in acorns *can* be poisonous if eaten in excess, causing problems in the kidneys and the linings of the digestive system.

The important point here is *if eaten in excess* - even mainstay pasture plants such as clover and ryegrass are listed as capable of being toxic if hungry animals are suddenly introduced to large quantities of lush growth.

On the other hand, if consumed at the rate at which the animals like to eat them and in conjunction with other food sources, tannins can have wide ranging health benefits for ruminants, improving their ability to digest protein and to resist parasites. Consumption can even reduce methane emissions. Tannins can have anti carcinogenic properties and protect against bacteria, viruses and fungi.

This is a complex subject, not least because individual plants can vary the type of tannins they produce in response to environmental circumstances, even to the point of producing different ones at different times of day. Moreover, individual animals can have different eating habits and differing genetic make-ups.

Maybe it is for these reasons that there is such a wide divergence of opinion as to whether acorns are poisonous.

Tannin is bitter tasting and is used by many types of plant to deter predation. As such it can discourage animals from eating more acorns than is good for them. The overriding risk for any poisoning is where hungry animals have no access to other food. That said, it appears precautionary to keep horses away from acorns, and also cows during their first trimester of pregnancy. Pigs on the other hand can be freely allowed to revel in them.

Acorns accumulating in the absence of grazing animals.

Livestock can simply help themselves to these energy rich supplements during the "autumn feed gap".

Designing Oak Plantings for Stock-fodder.

Although acorns have been utilized and valued as food for humans, livestock and wildlife in many cultures across the world, across many historical periods, ranging from the paleolithic to the modern, this has not much been reflected in the breeding and propagation of improved varieties for acorn production.

To some extent this is understandable because usage historically occurred in places where oaks were naturally abundant; where a degree of improvement could be achieved simply by removing mediocre trees in order to free up superior ones to spread their canopies - broader crowns produce more acorns. Also, the fact that oaks do not graft as easily as, say, almonds or pistachios, has not favoured their development as much as other tree crops.

For we who don't have the good fortune to possess natural oak stands and need to plant from scratch there is some consolation. We are given the

opportunity to create enhanced acorn production regimes through using a broader mixture of oak varieties, rather than are typically found in natural stands.

In this way the acorn drop can be stretched out over a longer period; three-to-four months even.

Planting a mixture will also help identify those which grow best in the specific local conditions and can help to even out the overall acorn drop from seasonal variation.

It is best to plant at a dense spacing with intent to do follow up thinning. This is important because oaks interbreed very easily so tend to have very variable progeny. There is an upside to this because the broader genetic base provides adaptability and resilience.

As always, diligent site preparation and good planting technique are important for optimum results but - with oaks in particular - supplementary watering in the first couple of years really helps to get things going - trees that get growing well generally keep doing so.

So:

- Start with a solid stand of mixed varieties chosen from those that are likely to be appropriate for the district.
- Remove any that are clearly falling well behind the average growth rate after 2-4 years.
- Take note of early and consistent bearing trees and consider sacrificing neighbors that are impinging on their development
- Make the final selection after observing feeding preferences (a plethora of empty acorn cups but few actual acorns on the ground can be a good indicator) and regularity of bearing.

Spring flowering can provide more comfort than a long-term rainfall forecast in predicting potential fodder availability six months hence.

Recommended Oaks and The Acorn Drop Calendar

(N.B. only those species which have been established in south western Australia for sufficient time to give an idea of their worth are included below.)

Early to Mid-Season

European White Oak Group

Most oaks that have historically been introduced into the south-west of WA belong to this group and - given their capacity for heavy cropping and their proven resilience - they should be an important component of any stock fodder planting.

Included, amongst others, are the fully deciduous oaks that stretch across the northern part of the continent (so called “English” and “French” oaks) and the semi-evergreen types that occur in the southern parts and around the Mediterranean Basin (such as “Portuguese” and “Algerian” oaks).

In a way the semi-evergreens can be thought of as variants of the deciduous types: ones which can productively carry their leaves deep into the warmer winter times before refreshing their crowns in early spring and, which apart from that, are much the same type of tree.

This line of thinking can be justified on the basis that the many historical introductions of both types into Australia, from many differing sources has resulted in a great deal of local sharing of genetic material within this group. So much so that the vast majority of local oaks now carry the semi-evergreen habit (despite being commonly referred to as "English Oak" when true *Q.robur* is actually a fully deciduous tree).

Such interbreeding leads to a broadening of the gene pool within individuals resulting not only in local adaptation but also greater inherent resilience.

As a consequence, it is now perhaps more practical to think in terms of strains rather than species. (In fact, it has been said of oaks that, because of their propensity to interbreed, they challenge the very concept of species.)

Strains that lean towards the Portuguese *(Q.faginea, Q.lusitanica, Q.rotundifolia)* can start bearing as early as March with the English *(Q.robur),* French *(Q.petrea)* and Algerian *(Q.canariensis)* being more mid-season: April/May.

American White Oak Group

Introductions from this group have been from a narrower base but the same interbreeding issues as above apply, but without the longer time span for local adaptation.

The deciduous American White Oak *(Q.alba)* and Swamp White Oak *(Q.bicolor)* from the eastern side of the continent have shown good promise for mid-season appetizing acorns as have the deciduous Valley *(Q.lobata)* and Blue *(Q.douglasii)* Oaks, and the semi-evergreen Engelmann *(Q.engelmannii)* Oak, the latter three all hailing from California.

Other Mid-season Oaks

The deciduous Sawtooth Oak (*Q.acutissima*) from eastern Asia, and the Vallonea (*Q.macrolepis*) and Turkey (*Q.cerris*) Oaks, both from the eastern Mediterranean, can well be included in the mid-season mix; while the evergreen Coast Live Oak (*Q.agrifolia*) from California looks to be very good as a late mid-season producer.

Coast Live Oak shows promise in terms of both growth rate and productivity.

Late Season Oaks

Two tough evergreens from the western Mediterranean region are proven local performers to round out the potential bounty. Cork Oaks (*Q.suber*) are 'early late-season' in May followed by Holm Oak (*Q.ilex*) which can extend into June.

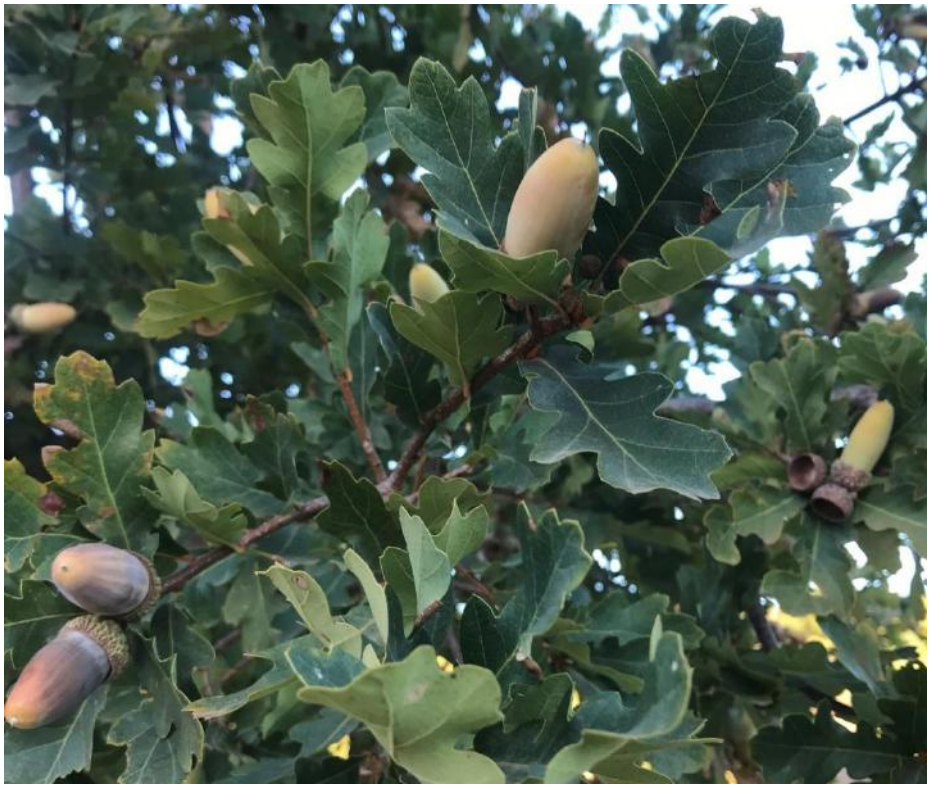
Others

The rich oak floras of California and Mexico show potential in theory but there aren't yet examples old enough in South Western Australia to prove the case.

While there are good examples of robust growth in the ornamental "Red Oak" group e.g. Pin *(Q.palustris),* Scarlet *(Q.coccinea)*, Red *(Q.rubra),* and Willow *(Q.phellos)* Oak, these are sub-optimal for feeding stock because their acorns are very small and/or their fruiting can be irregular – up to four years between crops for some.

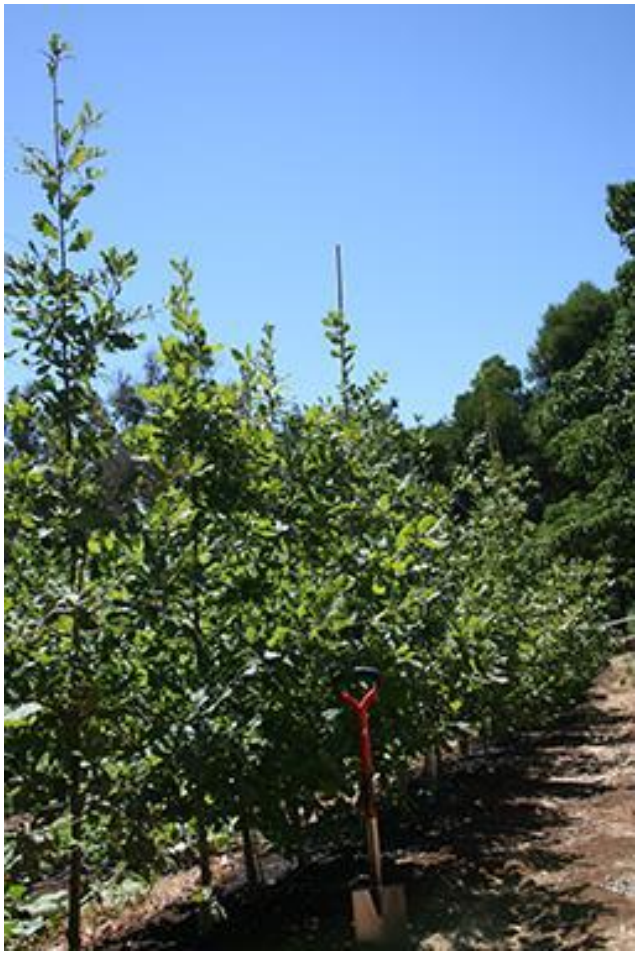
How Fast Do Oaks Grow and How Long Before They Give Acorns?

There is no straightforward answer to this question because of the great variability that oak progeny display. Variability that extends beyond growth rate and growth habit to the sweetness of the acorns and the time taken until the trees come into bearing. Added to which are factors such as suitability to site and attention to culture.



Blue Oak (Q.douglasii) at Golden Valley Tree Park already bearing respectable crops nine years after planting (but it was not the first time it had borne fruit, nor the only oak in the Park to produce within its first decade).

With this variation comes opportunity. Given good growing conditions and fortunate genetics, trees can come into production quite quickly - some bear acorns in only their third year from seed in the nursery; and some trees produce respectable crops (relative to their size) in less than ten years.



Some three-year-old Oaks in the bareroot nursery at Small Tree Farm already bear acorns.

These examples reinforce the message of:

- choosing varieties appropriately
- planting densely to allow for future selection
- applying effort to get the trees off to a good start
- following up by thinning to maximise growth of the promising trees.

It does, sadly, take a while for groves to become fully productive, but they can then bear returns for a long time with little further input.

This Oak Grove east of Greenbushes is in only its early twenties.

As the old saying goes –

“The best time to plant trees was twenty years ago.

The next best time is now.”