

# Get more from your straw



*from theory  
to field*

**A recent review has established some of the true costs of straw removal. CPM assesses the findings.**

*By Tom Allen-Stevens*

Whenever you've taken straw off the field, do you feel you've done something wrong? Perhaps you've overstretched your resources without giving enough back, put too much stress on your soil without offering something in return — you can almost hear Mother Nature herself sobbing as the last cartload of bales leaves the field.

Well it's time to banish such pangs of guilt — you've done nothing wrong and could even have done the world a favour, according to a study commissioned recently by HGCA.

"Straw removal is one subject that's curiously emotive," notes Harley Stoddart of HGCA. "It invokes more passion than many other aspects of farming — people believe there's a morality issue in selling straw, rather than incorporating it."

### Alternative uses

Within the Agricultural and Horticultural Development Board (AHDB) there's a working group that looks at straw use across all sectors, he explains. "AHDB supports all uses and markets for straw, including incorporation. But a number of new and alternative uses have surfaced in recent years, such as for straw-fired power stations. Making an informed decision on whether to bale has new dimensions for many arable farmers, so it was time to review the evidence base."

There are three main areas that straw use has an impact on, he continues. "Nutrient content, and in particular phosphate (P) and potash (K), is a major consideration. There's also the question of its contribution to soil organic matter (SOM). Then there's the impact on soil physical conditions — compaction or

agronomic issues associated with removing or incorporating straw."

As well as the practical implications, the aim of the review was to study the environmental and economic aspects, with current straw and fertiliser values bringing the assessment up to date. The task of gathering the information was handed to an ADAS team led by Dr Fiona Nicholson.

"In order to ensure we looked at all aspects of straw use, we divided the work between specialists within ADAS," she explains. "There were three main areas we looked at: soil, agronomy and logistics. It was purely a review of existing literature, but we looked at work that had been done overseas, as well as in the UK, especially where there were gaps in UK-based literature."

It wasn't long before some interesting findings began to surface, she says,

*“People believe there's a morality issue in selling straw, rather than incorporating it.”*



*With new and alternative uses now available for straw, Harley Stoddart feels making an informed decision on whether to bale has new dimensions.*

especially when it came to soils. “Anecdotal evidence suggests incorporating straw improves workability and soil quality. But there’s very little real evidence to back that up, particularly in the short term, which really surprised us.”

In fact, the economic value of incorporating straw, in terms of SOM, is negligible, she concludes. Typical applications of wheat and oilseed rape straw could retain about 150kg/ha and 80kg/ha of carbon (C) in the topsoil, equating to less than 0.2% of the typical C content of an arable soil.

“Maintaining or increasing SOM should be an important objective for all growers. But incorporating straw isn’t the best way to achieve this. It’s far more effective to apply farmyard manure (FYM), biosolids or compost.”

These applications typically increase topsoil C levels by 630kg/ha, 1500kg/ha and 1400kg/ha respectively, she points out. “If you don’t have access to these, incorporating straw is better than nothing, but it doesn’t do much.”

It doesn’t do much for soil physical condition either, concluded the review team. Only after at least eight years of repeated additions would incorporating straw make

any measurable difference. “The economic value would be very low compared with straw prices.”

Straw incorporation returns significant amounts of P, K and magnesium (Mg) to the soil, however. Wheat straw is worth £3/ha for P and £17/ha for K on soils at Index 2 or less, plus a £15/ha value for the Mg at Index 1 or less.

“Fertiliser values range from £16/ha for OSR straw to £53/ha for oats. Where soils contain sufficient P and K, it may make more economic sense to sell the straw, however,” points out Fiona Nicholson.

### **Controversial finding**

Another interesting, and possibly controversial, finding was straw’s carbon-storage value in relation to climate change, she continues. “If all cereal straw in Great Britain was incorporated, that could result in CO<sub>2</sub> equivalence savings of 472kt. But much of what’s removed is returned to the land anyway as straw in FYM, so is it really additional C storage?

“Greater carbon savings could actually be achieved by burning the straw and generating power. This would displace the CO<sub>2</sub> emissions currently generated through burning fossil fuels.”

Straw baling and removal means more travelling on the land, adding to the risk of compaction, however — the extra cost of subsoiling could be as high as £55/ha.

On the agronomic side, straw incorporation could have a ►

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*The nutrient and organic matter value of straw may not stack up against the potential returns from baling and selling it.*







*Applying manure is a far more effective way of building soil organic matter than incorporating straw, maintains Fiona Nicholson.*

► significant impact on slug numbers, notes Fiona Nicholson. "It might cause populations to approximately double. With low slug numbers, that's not going to be too much of a worry, but in a bad slug year, it could cost an extra £20/ha through extra control."

Cereal straw removal has little impact on disease — if anything, the presence of straw reduces diseases such as eyespot. But in OSR, it's possible that removing the straw could tone down bad infections of light leaf spot, saving over £40/ha, and limit verticillium wilt and sclerotinia losses by more than £70/ha. "Further work's needed to verify these estimates," she notes.

Mechanics and logistics were where there's the greatest scope for differences between farms and situations, with personal preference having a significant bearing on costs and benefits. Chopping straw adds about £4-5/ha in fuel costs, while straw sales off the field vary from £25-50/ha, if sold in the swath, up to as high as £150/ha for those who bale, cart and store the straw themselves.

### Delayed cultivations

"Straw fate can be swayed by the practicalities of cultivation and establishment," points out Fiona Nicholson. "In a normal year, the worst result of delayed straw removal is to delay cultivations by a few days. But towards the end of harvest, delays could be more critical, especially if they held up OSR establishment.

"In a worst-case scenario, unremoved swaths could prevent autumn drilling, and the gross margin cost of having to switch to a spring crop would be about £100/ha."

The findings of the review have been drawn together in a decision tree to help growers make a more informed choice at harvest time (see p31). "What was quite clear from the study was that, when it comes to what you do with straw, this always depends on farm circumstances, economic climate, risk of soil compaction and a host of other factors. These change on a regular basis, so what's right in one

year may not be the best move in the next. Growers should always review their decisions," recommends Fiona Nicholson.

There was a lack of information on the retention of organic matter for a wide range of different soil types throughout the UK, which could refine decisions about how to maintain or replenish SOM, she notes. A current research project, led by Rothamsted, may plug the gap here however.

A range of manures is under test across a series of seven farm-scale trials. Anaerobic digestate, FYM, straw, compost and certain mixtures of these are being compared, with differences to the crop

*Chopping straw adds about £4-5/ha in fuel costs, but can mean more timely drilling if there's a late harvest.*



## Straw-for-muck has multiple benefits

Every year, David Utting bales and carts away the straw off around 690-800ha from his own mixed farm at Bungay, on the Norfolk/Suffolk border, and from three nearby arable units. But then he spreads farmyard manure from his dairy herd on around a third of that area.

"You're taking a little bit of nutrient value away in the straw, but in my opinion, that's not worth worrying about — there's far more value in the muck that goes back on," he says.

Farming in partnership with his brother, Shaun, David Utting has 270 milkers, while followers and beef cattle bring his total herd size to around 800. With only 120ha of arable, but surrounded by all-arable farms, the muck-for-straw deal works well for all concerned, he says.

"I need good, clean dry straw for the dairy herd. We take a little more than we need in most years, but I've sold a load or two of straw to Wales, and there are other uses I'm looking at."

Straw yield varies significantly, he says, and can be as poor as just 1.2t/ha, but generally he

takes 5-7.5t/ha, put into square Hesston or round bales. "The best straw comes off straw walkers. Rotary combines tend to chop it up, so it's not only hard to bale, but doesn't spread well in the yard."

He aims to keep to the tramlines in the field as much as possible, running on low ground-pressure tyres to minimise any potential compaction problems, with two JCB telehandlers and four articulated bale trailers to clear a field as quickly as possible.

"Logistics can be a nightmare, especially if it turns catchy," he notes. "But as long as there's a bit of understanding and some give and take, it's generally not a serious concern — on a good day, we can clear 120ha."

Muck spreading can be an even tighter operation, with around 25-30t/ha of FYM spread just in front of the oilseed rape drill through three Bunning spreaders on flotation tyres. "Again, it's a good time of year for the operation. If it turns wet, it can get a bit dauby, but it makes a much better job than slipping around following the



*David Utting removes the straw from his neighbour's fields in return for muck from his dairy herd.*

maize harvest," says David Utting.

"We don't like to get too far in front of the drill so all the goodness of the muck is incorporated into the soil. But it works well for the farmers and they're keen to have the muck — the crop that receives it looks fantastic. Some of their land has quite low indices, so it helps bring these up too."

On the straw side, he's considering a number of markets, including more to the West Country, but wonders whether there may be alternative uses closer to home. "We've workshops for an engineering business that need heating. It may be a good idea to consider a straw-fired burner and save on some energy bills," he says.

and soil closely analysed. The work is based on findings from the Hoosfield barley experiment, run alongside Rothamsted's 150-year Broadbalk wheat trials. Here, adding FYM to plots that hadn't received any for many years, soon turned them around, with both a yield and straw gain of 1t/ha.

### Maintain SOM levels

For Harley Stoddart, there's no question that growers should seek to maintain or improve SOM levels, but whether straw incorporation helps is more dubious. "There's 2M tonnes of potentially available straw that could be sold rather than incorporated. Hopefully the review will not only help inform farmers of the right choice for them, but guide how the terms of new contracts for straw might be put together," he says.

Elements of the review will be drawn into a topic sheet, while the decision tree is also available. It's also being used to inform current research projects, contribute towards the body of work

## Research round-up

HGCA project 2190002, Straw incorporation review, ran from March to June 2013. The aim was to conduct an evidence-based literature review of the potential environmental and economic impact of wheat and oilseed rape straw incorporation versus removal for UK agricultural situations. Led by ADAS, its cost was £19,962, funded by HGCA.

HGCA project 3787, Improvement of soil structure and crop yield by adding organic

matter to soil, runs from Sept 2012 to Aug 2016. Its aim is to find the minimum addition of external sources of organic matter to bring about the maximum improvements in crop yield and soil and environmental quality. Led by Rothamsted Research, with partner Cranfield University, its total cost is £1,770,982, with £774,999 funded by HGCA, and Defra and DARD providing additional funding.

co-ordinated within the soils platform and to steer the work of the AHDB straw working group.

"The review should help growers realise where there's an opportunity to benefit from straw sales without being drawn by baseless arguments on the morality of using straw for energy, for example," he maintains. "The clear message is that, as long as you're offered a good contract for straw that suits your situation, you should go for it." ■



Paper crumble is another material applied to the land that can help build soil organic matter

## Should you bale your straw?

