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Minimising organochlorine residue risk in animals during drought

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Drought increases the risk of residues above the Maximum Residue Limit (MRL) being detected in animals sold for human consumption. During adverse seasonal conditions producers of these animals must be extra careful in ensuring residue levels stay below 50% of the MRL. It is a specific requirement of Property Management Plans (PMPs) that management contingencies applicable for adverse seasonal conditions are identified.

There are two factors that contribute to an increase in the risk of animals sent for slaughter containing detectable residues:

- animals losing weight or unable to put on condition due to lack of feed;
- greater intake of soil contaminated feed.

Note:

Organochlorines (OCs) are present in the fat of animals but are not lost when animals lose that fat. Instead the OCs concentrate in the remaining body fat increasing the level of contamination. Allowing animals to lose and then regain condition will NOT reduce OC levels.

Soil Contamination

Residues in animals are most often caused by ingestion of contaminated soils previously treated with OCs to control various insect pests. The soil attaches itself to pasture plants and is consumed through general grazing. The dust and mud splash usually stays below the 50mm mark and it is easy in a good season to ensure animals graze no lower than this. However, in adverse seasonal conditions managing this is more difficult.

In order to maintain an adequate diet for stock, producers may feel the need to put their animals on contaminated land, increasing the possibility that they will consume OC residues. Sheep, for example, are capable of rooting out sub-clover seed. If the pasture is on OC affected land the animals will accumulate residues very quickly by consuming soil with the seed.

The root structure of plants is also a determining factor with regard to the extent of OC accumulation. Plants with root balls contain larger amounts of soil than those plants with less dense root structures. In a drought year, when in dry dusty paddocks, it is easier for animals to pull out whole plants thus consuming more soil and potentially increasing the accumulation of residues in their system.

It is important to note that no 'safe' soil residue levels have been set. This is because paddock soil levels are not a good indicator of OC levels in cattle grazing the pasture. There are a variety of other factors such as 'hot spots', season, pasture variety and condition, soil type and animal condition that affect animal levels. (Refer to Farmnote 69/2005 'Factors affecting organochlorine contamination' and Farmnote 49/2005 'Effect of soil type and structure on organochlorine animal uptake' for further information).

Pasture Contamination

The level to which plants become contaminated depends on the type of soil in which they are grown. Plants grown on soils with a high organic content are less likely to have high OC residues than plants grown on sandy soils. This is because OCs are strongly bound to the organic content of soils which means transfer of OCs from the soil to the plant is at a lower rate. Organic soils are less prone to being splashed onto plants. However, when drought occurs, organic soils can contaminate pasture plants due to the dry dusty conditions.

Residues can also contaminate pasture plants and fodder crops by uptake of these chemicals via the roots. The level of residue depends on the soil, season, plant type and relative stage of plant growth **but is generally very small compared to plant soil contamination.** Taller plants generally tend to have less OCs than smaller ones because the tops of plants contain less residues than the lower sections. In addition, taller plants tend to shed their lower leaves which reduces the contamination load. It has also been found that residues are less in plants with a high water content. So plants with growth stunted due to drought are likely to have a greater risk of residues.

The MRL for stock feed is low at 0.05 parts per million (ppm). This is because residues accumulate quickly in animals. Even at 0.05ppm it would only take a growing 400kg steer about ten days to obtain a residue level of 0.1mg, or 50 per cent of the MRL for meat, if fed solely on contaminated feed. In drought conditions this would be less as the animals would not be getting enough feed for growth. (Refer to Farmnote 72/2005 'Production of stock feeds from organochlorine affected land').

Unconventional Feeds

In times of drought producers often look to unconventional feeds to maintain the dietary requirements of their animals. However, it is important to let the seller of the feed understand the purpose of the transaction. Buyers should obtain a declaration that the feed is not affected by chemicals including OCs. Contamination can occur at any stage between production, harvest storage, processing and transport. This includes storage as OCs vaporise and can be absorbed into feed from silos and sheds previously treated. Potential soil contamination should be checked.

Screening tests for OCs in fodder does not pick up other chemical contaminants so buyers need to specify what tests are required if assurance that the feed is clean cannot be obtained from the seller. In addition, MRLs may not be set for some of these crops so the potential for OC residues may not have been considered.

Vegetables

Vegetables are often used in addition to pasture based feed for cattle. It is likely during times of drought that more producers will look to vegetables as a feed source. In most cases this is suitable as vegetables have a high water content and do not readily accumulate residues. However, low growing plants and root vegetables will be contaminated by soil if grown on OC affected land. They can be used for animal feed if they are first thoroughly washed and the soil removed prior to feeding out. It should be noted that the skins of potatoes, carrots and turnips have been found to contain OC residues, particularly if they have been grown on land with high levels.

Some vegetables have been found to have minute amounts of OC residues in areas of the plant that are not in contact with soil, particularly those with a lower water content, which indicates some translocation of OCs. This is generally too low to be of concern unless the produce is fed to animals on a continual basis. OCs will gradually build up in animals even from a low base. Animals fed only with contaminated feed will become contaminated very quickly, especially if they are unable to fatten.

If producers do decide to feed vegetables to cattle during times of drought they must ascertain the OC status of the land in which they have been grown. In addition, vegetables should not be fed out on OC contaminated land as animals will pick up residues through the soil.

Hungry Stock

It is difficult to keep animals confined to areas with minimal feed and they will break down fences to find something to eat. This is particularly a problem for producers who have residue affected paddocks containing feed. There is the need to be doubly careful that fences are suitable. Depending on individual management practices it is possible to feed some stock on affected land and still produce animals suitable for slaughter even during adverse seasonal conditions.

Management Options

Changes to the amount of OCs in body fat occur through lactation, metabolism and dilution. The capacity of animals to fatten or excrete residues through lactation, are the most important factors in managing cattle and sheep on OC affected land. Lactation and dilution (addition of clean fat) whilst on clean land are the best methods of reducing OCs in animals.

In seasons of drought both of these methods are difficult to manage as they require amounts of clean feed that may not be available. It is also problematic in that when food is scarce, fattening and pregnancies are difficult to achieve.

There are, however, a number of management choices available to producers with OC contaminated land affected by drought. Producers need to determine, for their individual businesses, the most cost-effective, reliable and least risk way of turning off animals with no detectable residues. Options include, amongst others, agistment, lot feeding or early sale.

Agistment

- Easy and reliable but should only be undertaken on clean land.
- In adverse seasonal conditions there may not be much available until decisions are made regarding crop failure or after harvesting.
- Until agistment becomes available animals may need to be lot-fed on clean land.

Lot Feeding

- Should only be undertaken with clean feed on clean land to allow animals to fatten and dilute residues.
- Feeding should be done in troughs (there are low cost options) to minimise soil pick up.
- Note that there is possibility of point source and 'hot-spot' contamination as in some cases the fences around the yards themselves have been treated with OCs and provide potential contamination which can occur even if the animals are fed in troughs.
- New feeds should be introduced slowly over a couple of weeks to prevent metabolic problems such as acidosis and bloat.
- Good quality feed should be available at all times and animals should be checked individually to ensure they are all getting adequate quantities of grain and roughage.
- Producers should test for the nutritive value of supplementary feedstuffs as they vary widely and it is difficult to plan otherwise. Digestibility, protein and fibre content must be at sufficient levels to ensure animals gain weight and dilute any OCs that may be present in their fat.

Early Turn-Off of Store Animals

- Producers whose animals have been grazing OC contaminated land need to sell animals under a permit as they may be violative.

- Residue affected animals that have lost condition prior to being on clean feed will need to be decontaminated by gaining what they have lost plus at least that weight again before they can be sold for slaughter.

Remember: If in doubt about OC residues, fat test your animals before sending them to slaughter or sell them as stores with a permit.

Cattle

Most cattle production that occurs on OC contaminated land is in the South-West area of the state. These dry land farms generally have a summer drought where annual pastures are of low nutritive value so most producers are used to supplementing their animals' diet. Little in the way of management practices will need to change but it is important to not finish cattle on areas containing OC residues. It must be remembered that even if cattle are fed for a short period of time on contaminated feed they will accumulate unacceptable residues.

- **Consider culling cows early.** In normal years cattle should be culled well before late summer so when feed is limited only the best animals are being kept on. In drought years producers should consider culling even earlier. While the returns may not be as high for summer culls it may be more economically viable in drought years to produce animals during the spring and early summer. This will enable producers to be sure they are producing animals with acceptable OC levels.
- **Run breeders on OC affected land.** If feed is available on residue affected land then the best management option is to run the breeders on it. Weaners, yearlings and cull cows should be lot-fed on clean feed if no clean pasture is available. It may be necessary to consider agistment or sale as store cattle for fattening on clean feed before being sent for slaughter. Young animals are easier to deal with than older ones as they have the greatest ability to grow and fatten, thus reducing OC residue loads when on clean feed.
- **Managing fat cows.** Fat animals with high residue levels are difficult to manage. For fat cows, rearing young is often the only way their residues can be reduced. However, ensuring animals are in condition to rear young during drought years is difficult and they will need to be run on clean land whilst lactating to ensure the OC levels are reduced.
- **Market animals as grain fed beef.** Producers can also consider the possibility of marketing their animals as grain fed beef. In times of drought there is often enough feed quality grain available at reasonable cost. There are certain guidelines set down by Ausmeat that need to be met but this is a way of turning higher costs of grain feeding during drought into a profitable option. At no time should the animals be lot fed in contaminated paddocks. The area used should be clean and perhaps tested for point source contamination.

(Refer to Farmnote 48/2005 'Reducing organochlorine residues in cattle', Farmnote 68/2005 'Beef breeders on organochlorine affected land', Farmnote 74/2005 'Weaners and yearlings on organochlorine land' and Farmnote 69/2005 'Factors affecting organochlorine contamination').

Sheep

As with cattle it is possible to produce sheep for slaughter with acceptable residue levels during adverse seasonal conditions. OC levels in sheep generally increase in summer and autumn when feed is limited and animals are losing weight. Drought tends to lengthen the time feed is unavailable so supplementary feeding of animals may need to continue for longer than is usual. A flush in pasture growth during winter and spring usually provides enough clean feed to reduce any OC residues that have accumulated over the summer. Sheep can run down residues very quickly on clean feed.

- **Consider early sale of sheep.** In a drought season it may be too costly and risky to try and produce animals with residue levels below the MRL. If the decision is made to sell stock then it should be done during the spring and early summer so animals do not lose condition and their OC levels remain below the MRL.
- **Agistment or lot-feeding?** In drought years many sheep producers may be able to agist their animals on drought-affected standing crops. However, sheep producers with OC affected land are unlikely to find such agistment in close proximity which will make this option costly and potentially risky. So although agistment is recommended before hand feeding, producers will need to take costs into consideration before making a decision. Sheep will need to be introduced to new feeds gradually.
- **Only feed sheep on clean land.** Sheep should not be allowed to graze crops that have been grown on land affected by OCs. The soil uptake is greater as the animals pick up spilt grain and the greener parts of the plants that are closer to the ground. Lot feeding and agistment of sheep must be on clean land if no clean pasture is available. Only animals that have been fattened on clean feed for a suitable period of time should be sold for slaughter.
- **Production of prime lambs may not be possible.** If, prior to finishing lambs for sale, a long enough period of decontamination on clean pasture is not possible then producers should consider other options. Finishing the lambs on other feeds such as grain is one method but it may not be economically viable. Producers may wish to consider selling of the animals under permit or to keep them on for sale as older animals.

(Refer to Bulletin 4465 'Dealing with a dry season'; Bulletin 4473 'Good Food Guide for Sheep'; Farmnote 73/2005 'Sheep and organochlorine residues', Farmnote 57/2004 ' Sheep health in a feedlot',

Legal requirements

The use of land with OC levels likely to result in agricultural produce with OC residues above the maximum residue limit (MRL) will be restricted by a quarantine notice. To use this land, the owner must seek written permission from the Department of Agriculture. Approval will be given by an authorised officer if the landowner can demonstrate that produce from the area will not have violative levels of OC residues. This will usually require an audited property management plan (PMP) that will indicate the products produced are below the MRL.

Other considerations

Erosion of bare paddocks by wind is a problem in many pastoral areas. In drought conditions the potential for soil erosion increases. If the land has OC residues there is the possibility of the OCs transferring to neighbouring areas which could result in either an increase in OC levels or the contamination of previously clean areas. To reduce soil erosion stock should be removed from dry paddocks. They may need to be feedlotted over summer and autumn to prevent overgrazing and soil erosion.

Sheep in particular will cause erosion particularly on sandy soils where it has been estimated that a single sheep can disturb two tonnes of soil in a week. On heavier soils the damage is limited to around 300kg but should still be viewed as a potential hazard.

A winter and spring drought can cause problems with the availability of enough pasture in the following season. Producers may find the seed set for the following year is down and adequate pasture may not be available early on. In addition, perennial pasture may take longer to recover from an adverse season so it may be necessary to continue lot-feeding animals for longer to ensure enough pasture growth to lower likelihood of soil contaminated pasture being consumed. Do not stop supplement feeding too early.

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