Slugs
A perennial problem

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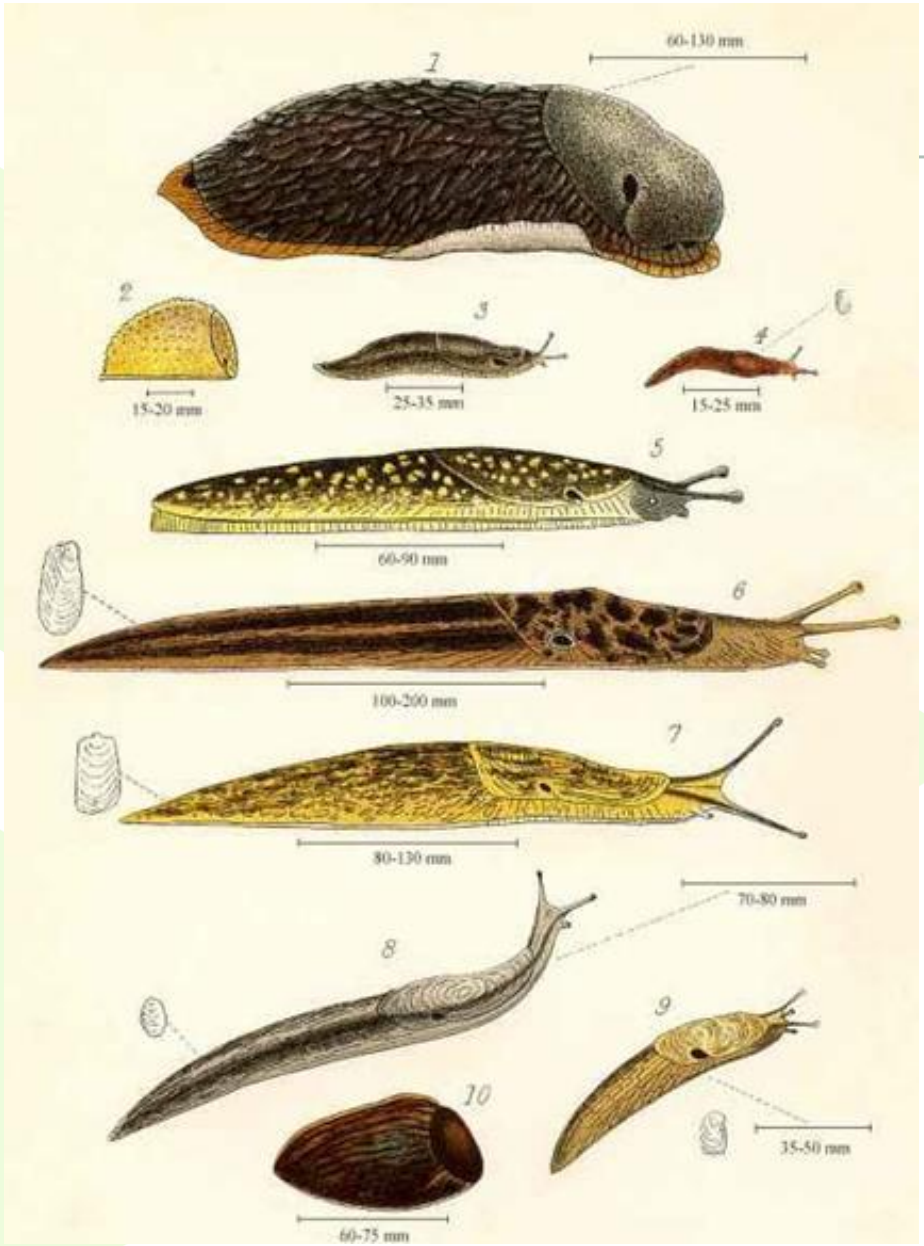
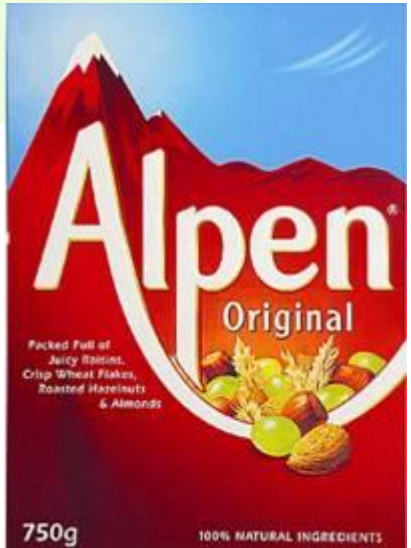

1
60-130 mm
2
15-20 mm
3
25-35 mm
4
15-25 mm
5
60-90 mm
6
100-200 mm
7
80-130 mm
70-80 mm
8
9
35-50 mm
10
60-75 mm

Slug risk assessment



Assess the risk using bait traps prior to sowing

- 3-4 per trap likely risk of damage in wheat
- 1 per trap for winter rape or potatoes

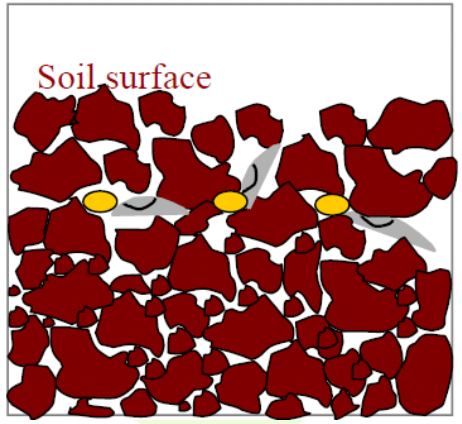
Bait with layers mash or Alpen

- Begin monitoring before planting
- Check traps (am) on several occasions, best if soil is damp

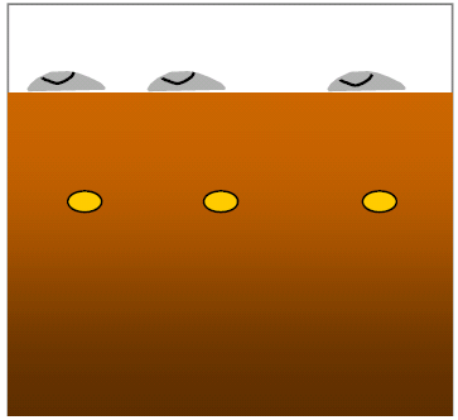
Slugs - management

- Minimum tillage gives considerable reduction in slug damage compared to direct-drilling
- Production of fine firm seedbeds is most important

Cloddy seedbed



Fine seedbed



- Drill a little deeper than normal (3-4cm) if seedbed is cloddy – but not if crop is late sown
- In cloddy seedbeds with large slug populations effective slug control is difficult

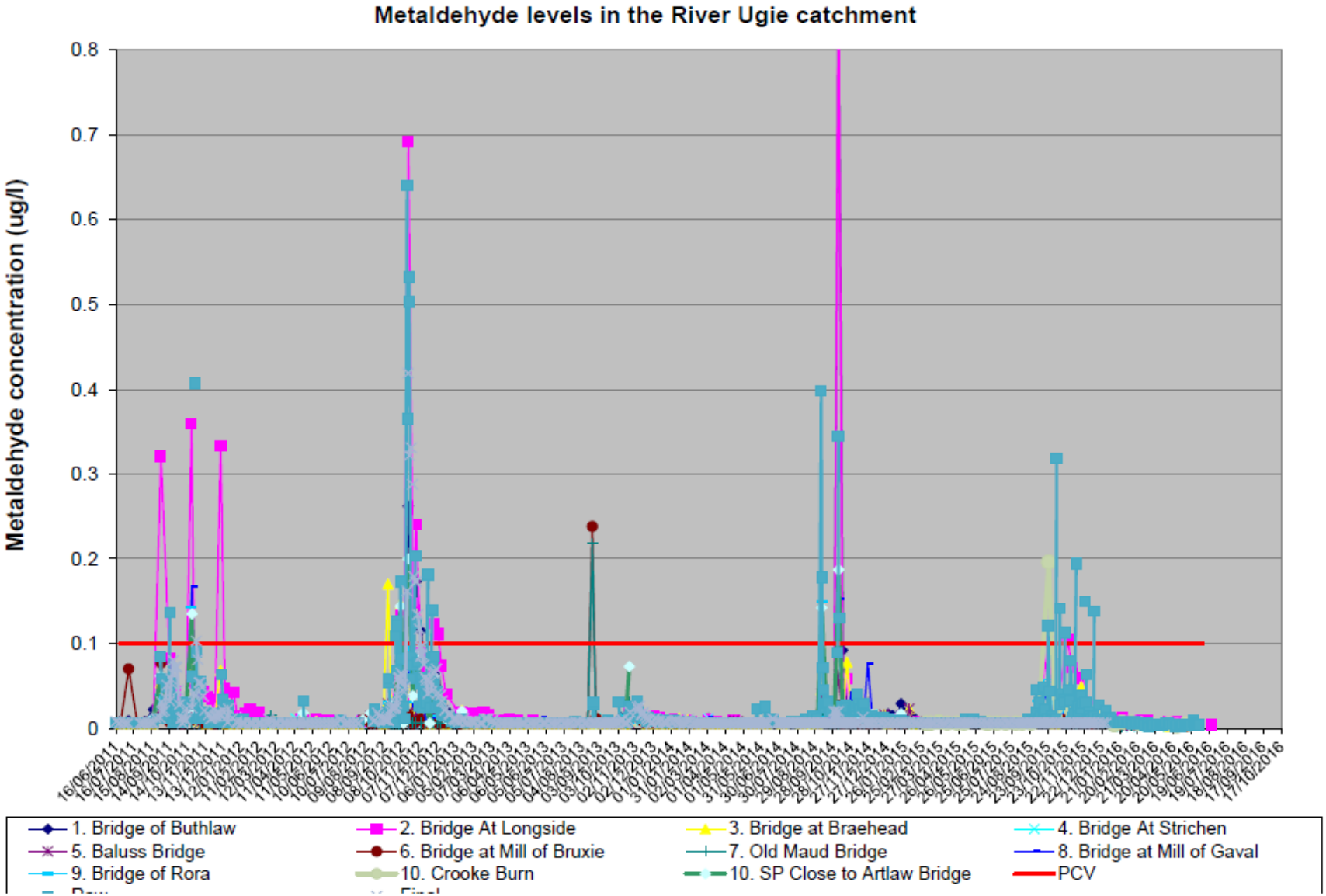
Field cultivations – good and bad

- Field cultivations can kill slugs and slug eggs and allow access by birds
- However, field cultivations can also affect beetles that will feed on slugs and slug eggs

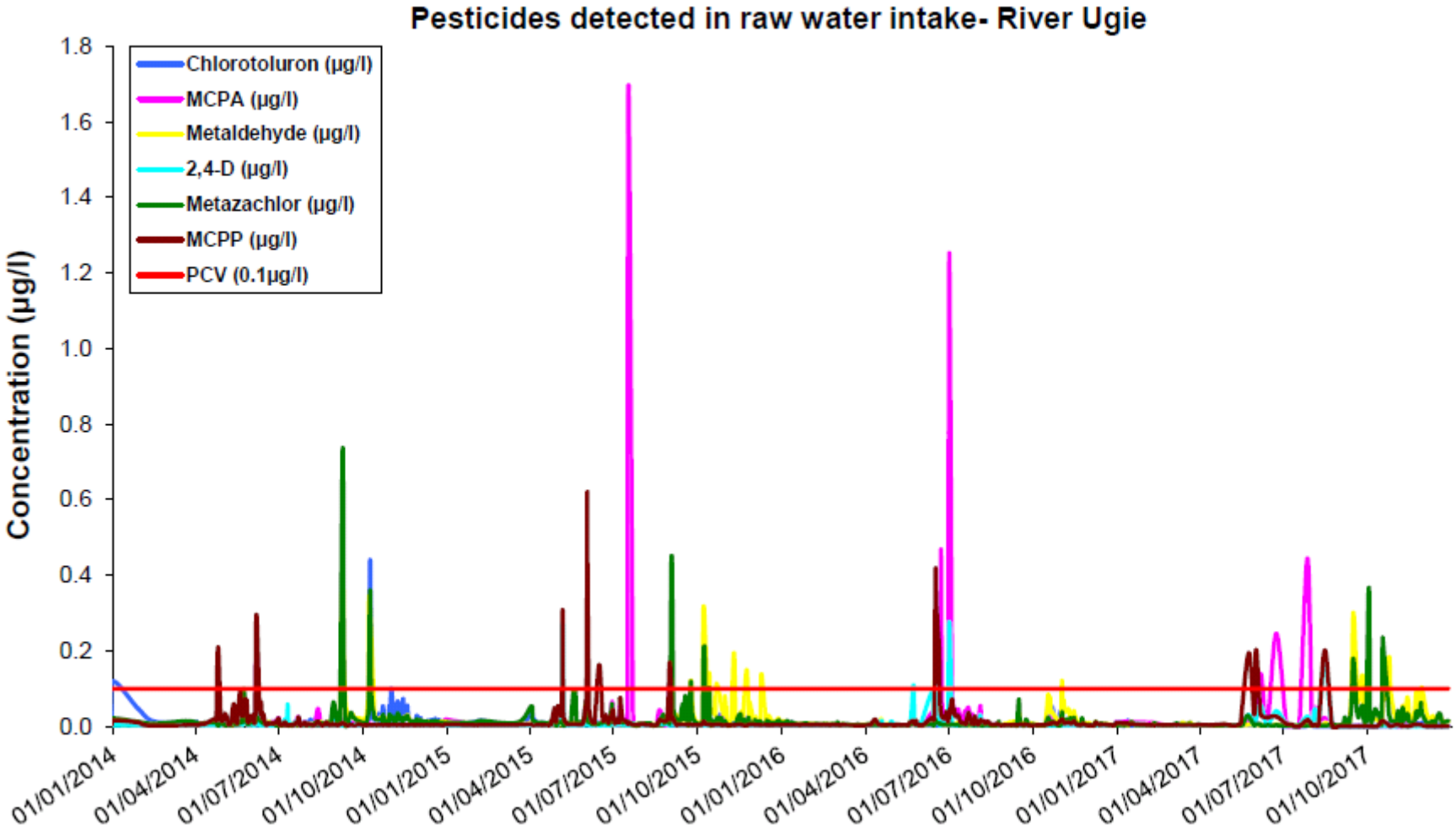
Slugs are getting all the breaks

- The European Union voted to revoke the use of methiocarb in slug pellets, due to their risk to grain-eating farm birds a couple of years ago
- The other major slug pellet product used in the UK is Metaldehyde, but it has come under pressure because it has been found in watercourses at levels that often exceed recommended limits in drinking water
- The other active ingredient available to control slugs is ferric phosphate

Water contamination by metaldehyde



Water contamination by metaldehyde

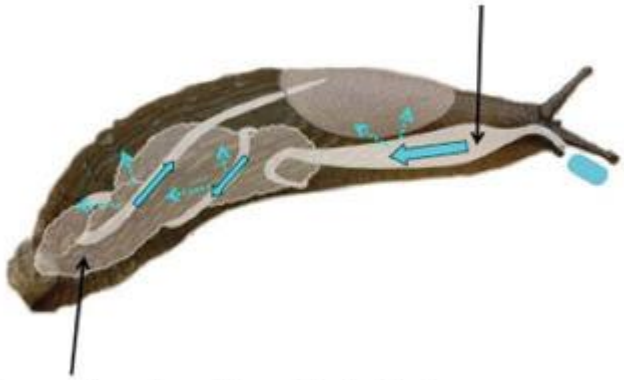


Metaldehyde Stewardship Guidelines

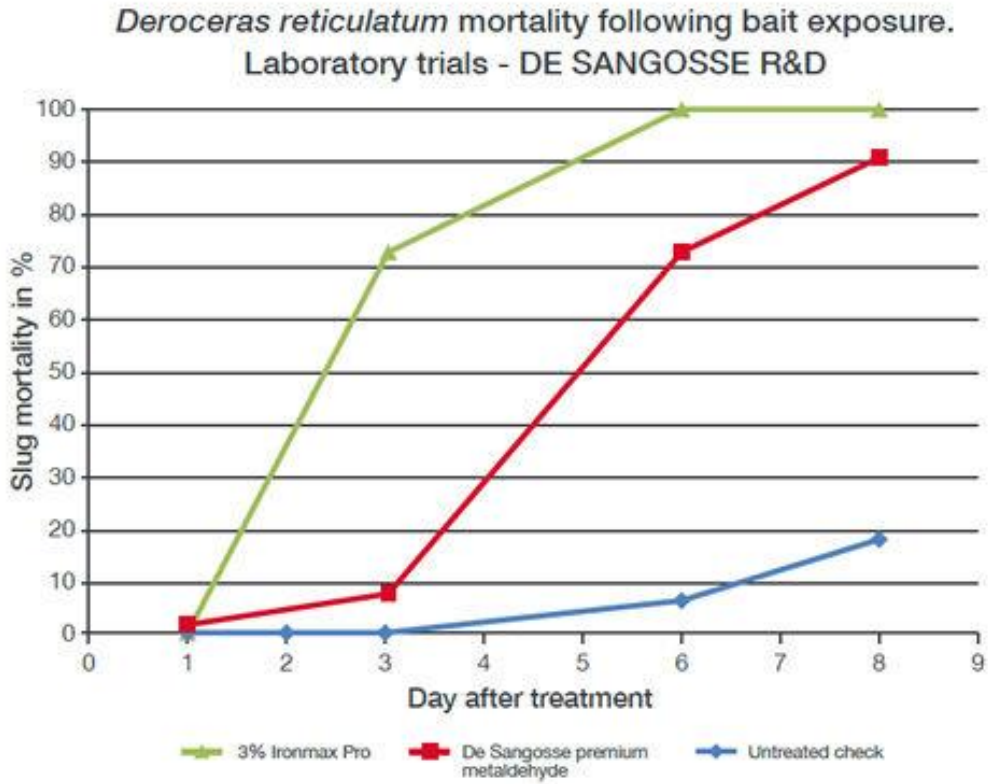
- No metaldehyde pellets should be allowed to fall within a minimum of **10 metres of any field boundary or watercourse**
- Maximum single application: **210 g metaldehyde a.i./ha**
- Maximum total dose rate from 1st August to 31st December: **210 g metaldehyde a.i./ha**
- Work out the total pellet application rate for the % of a.i. in your chosen metaldehyde product (slugpelletcalculator.co.uk)
- Maximum total dose rate: **700 g metaldehyde a.i./ha/calendar year** (from any combination of metaldehyde products)
- Do not apply when heavy rain is forecast
- If drains are flowing do not apply metaldehyde slug pellets

So is ferric phosphate any good?

Ingestion of pellet, leads to vital organs being overloaded with iron, resulting in death



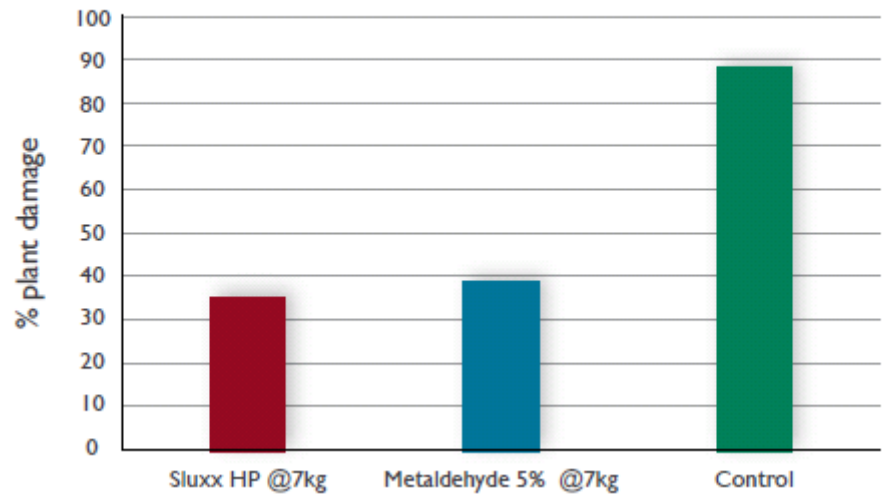
Secondary function of interfering with mucus production



How does FF compare to metaldehyde?

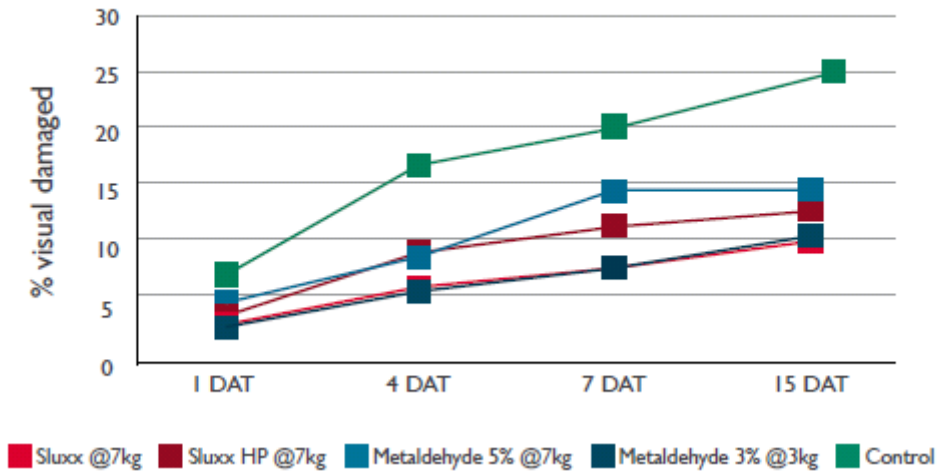
Efficacy in oilseed rape: % Plant damage

Source: W. Neudorff GmbH KG.



Efficacy in winter wheat: % Plant damage

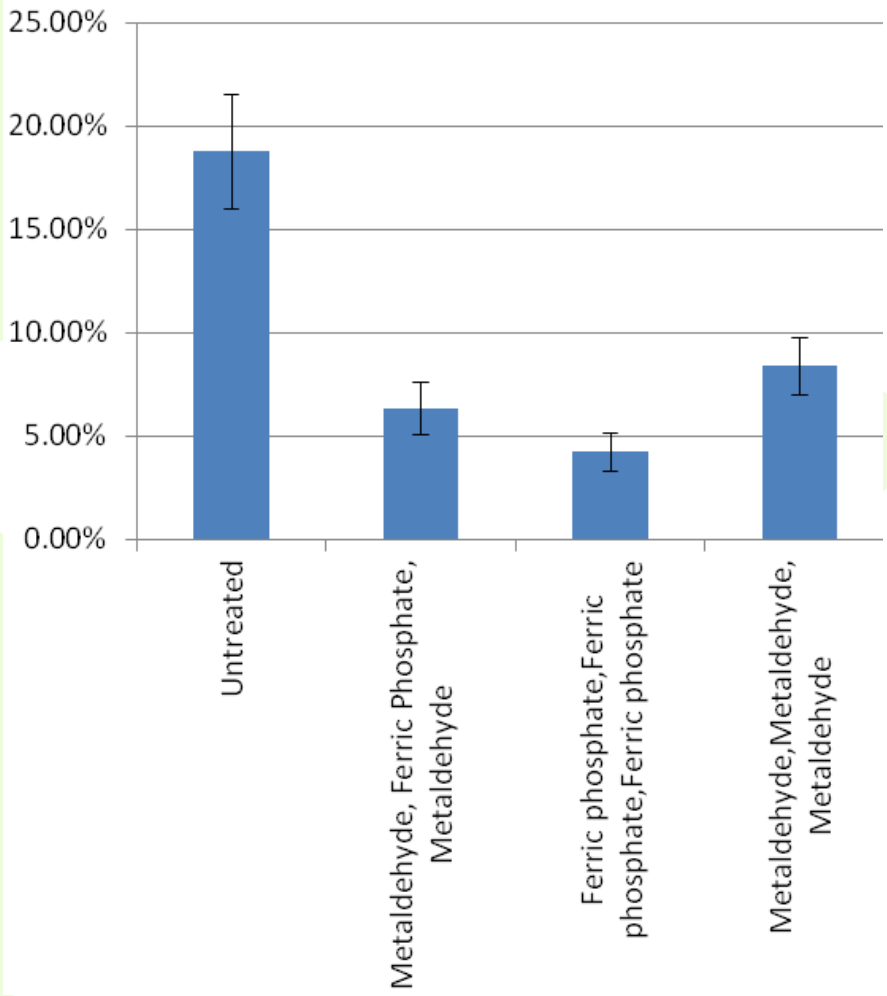
Source: W. Neudorff GmbH KG.



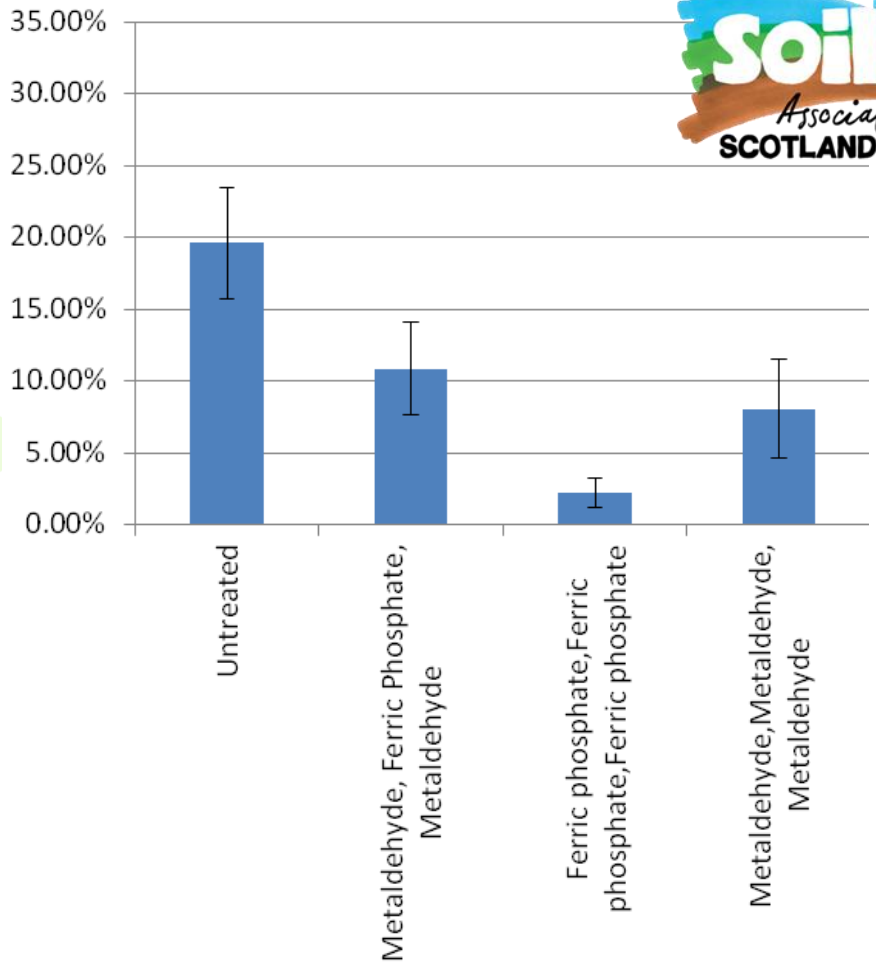
AHDB Potatoes Slug trials 2015 – potatoes using a 3x programme: TDS Major (metaldehyde) and Sluxx HP (ferric phosphate)

Just before the crop canopy meets; around 4-5 weeks later (when rainfall/ irrigation was present); and at burning down of the crop

% tubers with slug damage at harvest



Midlothian trial



Lincolnshire trial

How does FF compare to metaldehyde ££££

- As a rough guide, the cost of applying the maximum single dose of ferric phosphate products is between £29-45/ha, compared to a maximum single dose of metaldehyde products of £31-50/ha
- 18 FF products approved for professional use on field in the UK
  - These include Sluxx, Sluxx HP, IronMax Pro, Aristo IP*, Derrex, Fe-est*, Fe-lyn*, Ferrimax Pro*, IronFlexx, IronMax Pro*, Iroxx, Slugger, Sluggo, X-ECUTE*

    * not approved for use on potatoes

Environmental profile of ferric phosphate

Environmental impact

The active ingredient in Sluxx HP, ferric phosphate, is virtually insoluble in water. It is however broken down in the soil. So, when Sluxx HP eventually biodegrades, it releases iron and phosphate into the soil which are then available as plant nutrients. It should be noted that Sluxx HP contains no EDTA.

There is no adverse aquatic environmental impact from the use of Sluxx HP, but it is a label requirement that pellets should not be allowed to enter water courses.

Ferric phosphate, the active ingredient within Sluxx HP, has low impact to other non-target organisms such as mammals, insects, earthworms, bees and birds. Toxicity studies on the product show that Sluxx HP has exceptionally low impact on all other non-target species as can be seen in the summary table below.

Toxicity studies: Human

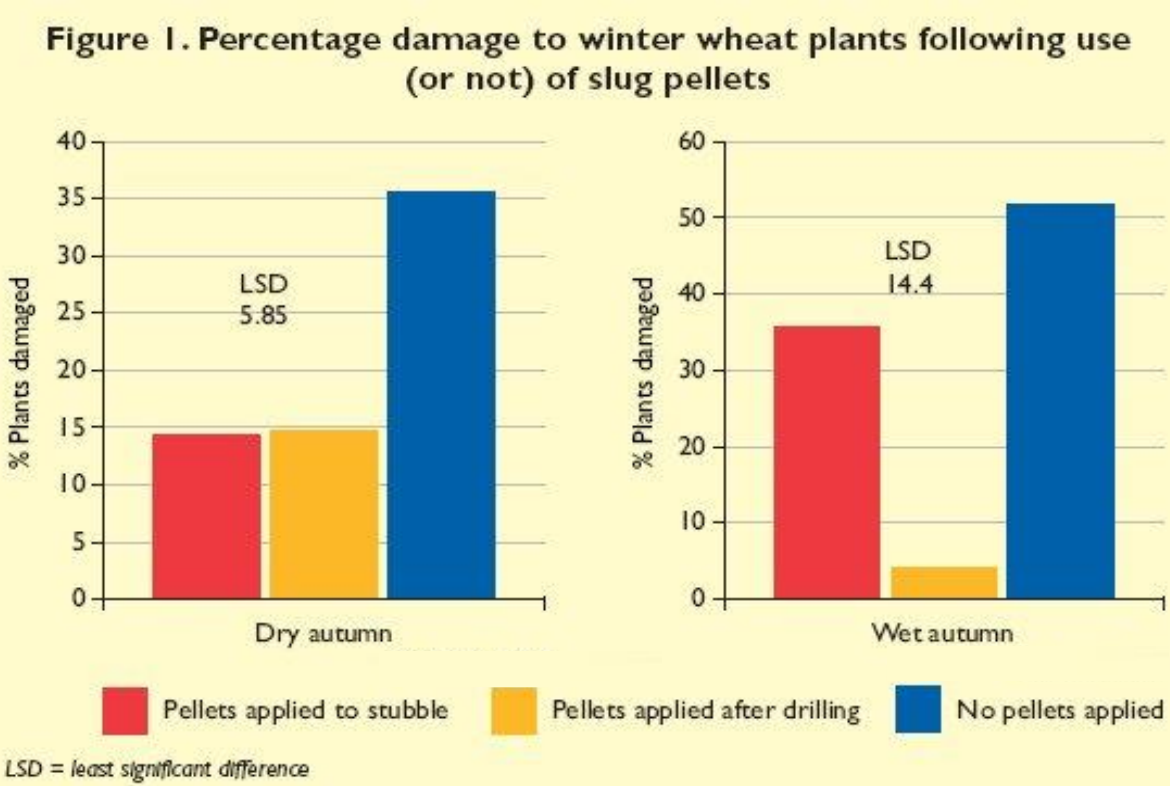
	Results
Acute oral toxicity	LD50 > 5000 mg/kg
Acute dermal toxicity	LD50 > 2000 mg/kg
Eye irritation	Non-irritant
Skin irritation	Non-irritant

Toxicity studies: Ecological

Study	**Results**
Acute oral toxicity Bobwhite quail	LD50 and NOEL* > 5000 mg/kg
Acute toxicity earthworms	LD50 > 1000 mg/kg
Acute toxicity to the ground beetle *Poecilus cupreus***	No effect on *Poecilus* at max. application rate
Acute toxicity to the beetle *Aleochara bilineata***	No effect on *Aleochara* at max. application rate

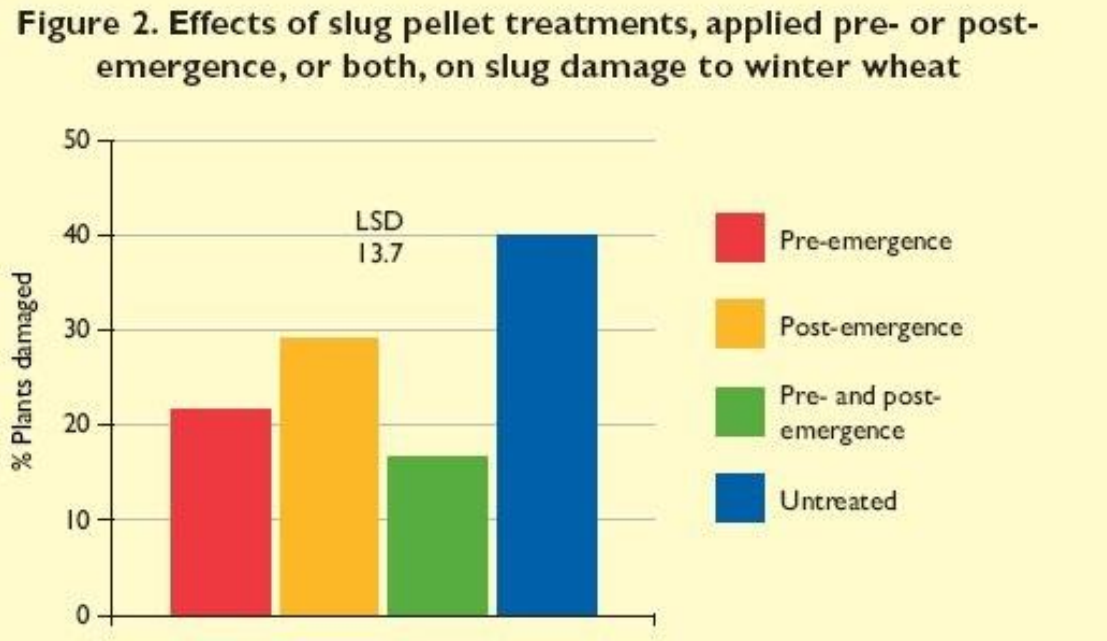
*No observed effect level **Ground beetles are natural enemies of slugs, they consume eggs of slugs

- Cereal seed treatments (primarily for BYDV) reduce grain hollowing to some extent (Deter, Redigo Deter, NipsIT INSIDE) – but on the way out as neonicotinoids
- Pellets - more baiting points the better so don’t cut rates
- Use pellets when slugs are on the surface - moist soils, no rain, warm, no wind
- Remember 10m from field edge you can’t apply metaldehyde so makes sense to use ferric phosphate pellets – conventional and organic cropping



- Conditions dictate best timing for pellet application

- Pre-emergence applications of pellets with follow up post-emergence if damage seen



Winter oilseed rape

- Good cultivation, fine seed bed
- 1 slug per trap
- After 2-3 true leaves crop should grow away
- Broadcast slug pellets at or after sowing when soils are moist

Slugs in potatoes

- Monitor slugs before planting – 1 per trap
- Plan months in advance – autumn treatment
- Apply at least 2 (ideally 3) full-rate pellet treatments
- Get one application on before crop canopies meet and another at burn down of the crop
- Avoid unnecessary irrigation
- If damage occurring try to lift early
- Ferric phosphate as good as metaldehyde
- Use ferric phosphate alone or alternate with metaldehyde in a 2-3 treatment programme

Slug damage in store?

- Slugs can be taken into store, particularly during wet conditions at lifting
- Slugs hitch a ride on clods of soil and in tubers
- Slugs will continue to damage potatoes in store
- Ensure soil and damaged tubers that could be harbouring slugs are graded out and tubers washed to be free of soil

What about biological control of slugs

- Use of biological control against slugs – Nemaslug®
- Nemaslug can target slugs below ground
- Cost a barrier but can be very effective
- Trials looked at integrating Nemaslug with slug pellet use and reduced rates and reduced water volumes
  - Place for Nemaslug at burn down timing only
- Can still have an effect after 4 weeks
- Very moisture dependent

Thank you for listening

Happy to answer any questions now or later on after lunch