Summary of actions needed

HYGIENE AND STORE MANAGEMENT
- Clean all areas where stock may be kept in stores, mills, around machinery; sweep at least once a week;
- Remove from store and dispose of sweepings and other rubbish;
- Remove from store all empty sacks and pesticides where other space is available; otherwise keep non-food items separated from grain and other food stock;
- Keep store well maintained and in good repair; repair cracks and crevices, make good where the floor has broken up, fill in holes in structure; make sure ventilators can be open and closed;
- Fit wire mesh to openings to stop rodent and bird entry; fill in holes in doors, floor and walls;
- Spray the fabric of the building, freight container or truck with contact insecticide solution to kill off insect pests in the empty store;
- Make sure that any sacks that are reused are free of pests.

STOCK MANAGEMENT
- Build stacks using an appropriate stacking pattern so that they are stable but easy to dismantle;
- Leave a gap of 1 m between stacks, from the walls and beneath the roof eaves; ensure that it is possible to gain access easily to all exposed surfaces, including the top;
- Build the stack on dunnage of pallets or poles, or on a polythene sheet if floor is level;
- Inspect the stock and the store itself at least once a week; check for the presence of pests and to confirm the effectiveness of pest control procedures that had been carried out;
- Use cards attached to stacks to record the history and performance of the commodity; use record cards/sheets to record pest control procedures and inspections

TRANSPORT
- Make sure truck or cart is clean and well swept;
- Spray the fabric of the transport with contact insecticide;
- Ensure that all paperwork related to the load is in order;
- Do not use hooks to load and unload sacks, rather use man handling or a conveyor;
- Do not overload;
- If transport can be made airtight, fumigate if pests are present.

PEST MANAGEMENT
- Fumigation should only be undertaken by trained personnel;
- Only fumigate in airtight enclosures or where it can be made airtight;
- Fumigation should last at least 7 days, before aeration begins;
- Aerate thoroughly;
- Dispose of spent fumigation tablets by tipping residue in water;
- Spray store with contact insecticide to kill off insects present before fumigation takes place; do not use insecticides to provide residual protection;
- Only trained personnel should handle and apply contact insecticides;
- Never work alone;
- Ensure a supply of clean water is to hand;
- Wash off spillages from the body or from other surfaces immediately;

- Accidents should be immediately reported and details of the chemicals used should always be made known to the doctor;
- Wash equipment thoroughly after each use or at he end of each day;
- Use a clean change of clothes each day.
- Always have warning notices posted for fumigation and pest control taking place.

- **Take care when handling synthetic** rodenticides; ensure bait is placed appropriately;
- Make sure stock is dry at intake; use appropriate drier if it gains moisture during period in store;
- Ensure that all non-essential people are not allowed access to the store.

Appendix
Calculation for the application of contact insecticide to store walls

There are three steps:
- Calculate the area to be treated
- Calculate the amount of insecticide solution needed
- Calculate the amount of diluted solution needed

The store is empty. The area to be treated will be the area of four walls and the floor (the roof will not be sprayed, there is no ceiling). The dimensions of the two short walls are 5 x 5 m. and of the two long walls 20 x 5 m. The floor dimensions are 20 x 5 m.

The total surface area of each short wall is 5 x 5 = 25 m^2.

The total area of both short walls is 25 x 2 = 50 m^2.

The total surface area of each long wall is 20 x 5 = 100 m^2.

The total area of both long walls is 100 x 2 = 200 m^2.

The surface area of the floor to be treated is 20 x 5 = 100 m^2.

Therefore, the total surface area of the store to be treated is: 50 + 200 + 100 = 350 m^2.

The insecticide to be used is 20% Actellic emulsifiable concentrate (e.c.) volume/volume (v/v). This solution therefore contains 20 ml of active ingredient (a.i.) per 100 ml of solution.

We want to apply the chemical at a rate of 1.0 g a.i./10 m^2 of surface. As we need to treat a total of 350 m^2, we will need: 350/10 * 1 ml of a.i. = 35 ml a.i.

However, the insecticide is only 20%. Therefore 100 ml contains only 20 g of a.i. 1 g a.i. is contained in 1/20 * 100 ml = 5 ml.

Therefore 35 ml a.i. is contained in 35/1 * 5 = 175 ml of 20% Actellic.

Thus we will use 175 ml of the insecticide in a water based solution. This solution has to be applied at a rate of 5 l/100 m^2. To treat 350 m^2 we will need: 350/100 * 5 l = 17.5 l.

Therefore to spray the store fabric we will take 175 ml of 20% Actellic and dilute it with just under 18 l of water (it is impractical to try to measure out the water more accurately).

If the store had three bag stacks in place we would need to calculate the floor space occupied by the stacks and subtract it from the total store area before calculating the amount of insecticide needed. This is because we cannot spray the floor occupied by the stacks.

If the three stacks were of equal dimensions: 3 x 4 m, then each would occupy 12 m^2, and the total occupied by the three would then be: 3 x 12 = 36 m^2.

As the total floor area is 100 m^2 (from above), the actual floor area we can spray will only be: 100 − 36 m^2 = 64 m^2. Then the total surface to be treated will be:

50 + 200 + 64 m^2 = 314 m^2.

We want to apply the chemical at a rate of 1.0 g a.i./10 m^2 of surface. As we need to treat a total of 314 m^2, we will need: 314/10 * 1 ml of a.i. = 31.4 ml a.i.

However, the insecticide is only 20%. Therefore 100 ml contains only 20 g of a.i.

1 g a.i. is contained in 1/20 * 100 ml = 5 ml.

Therefore 31.4 ml a.i. is contained in 31.4/1 * 5 = 157 ml of 20% Actellic.

If we do not have an accurate measure for the Actellic, we can measure out 160 ml.

We will also need less of the diluted solution: 314/100 *5 l = 15.7 l or, less precisely, 16 l.

The food produced by the farmer has a long journey to travel on its way to the consumer's plate or the animal's feed trough. There may be a long chain through which the crop will be transported, stored and processed, with accompanying losses in quality, quantity, nutrient content and monetary value. These losses can be substantial, and if they are allowed to occur and build up, will result in a significant loss in revenue for the farmer and the end user.

This booklet describes the causes of these potential losses and illustrates actions that should be undertaken to prevent or remedy them. It assumes that grain and grain products, including flour and animal feed, have reached the first point in the marketing chain after leaving the farm. The situation of transit storage and long-term storage is considered, and millers, traders and feed compounders are also included.

The booklet is not intended to be used solely by the ultimate beneficiaries themselves, though it may well be. It is intended to be used by anyone who is involved in providing practical advice to counteract the causes of deterioration of grain and grain products along the marketing chain. These may be pest control suppliers, retailers and wholesalers, extension personnel within and outside of government, staff of trading organisations including marketing boards, and trade unions.