



Department of  
Agriculture  
and Fisheries,  
South  
Australia

# fact sheet

AGDEX  $\frac{451}{67}$   
December, 1977

## Achieving a satisfactory yolk colour

By Bob Hughes, Senior Research Officer, Poultry.

Laying hens need a daily supply of egg yolk additive in their feed to produce a satisfactory egg yolk colour. Egg producers who mix their own layer feed can ensure that each hen receives the correct amount of egg yolk additive by observing carefully the following common sense rules.

### Mixing feed

- Weigh the egg yolk additive each time feed is mixed. Alternatively, carefully weigh out the required amount of additive into a small jar or tin and use the same level for each mix. Remember, a change in the quantity of feed to be mixed requires a change in the amount of additive.
- If you buy egg yolk additive of a different brand or from a different supplier, check the quantity to be added to the feed because its concentration may be different from the additive used previously.
- Avoid the temptation to buy additive in bulk to last more than six months. The price per unit weight may be lower but an opened container of additive will deteriorate. Rate of deterioration depends on the storage temperature, sunlight and availability of air. To economize, share a bulk container with one or more other producers. Keep the unsealed container air-tight, out of direct sunlight and in a cool place. (This advice applies equally as well for vitamins).
- To achieve an even distribution of the small quantities required, make a premix of the egg yolk additives, vitamins and trace minerals. This can be done easily on most farms by premixing the egg yolk additives and other micro-ingredients with finely-crushed grain and meatmeal in a cement mixer. The premix, which should amount to about five per cent of the total mix, should then be

gradually put into the large mixer as the bulk of the other ingredients (grain and meatmeal) are being loaded.

Some producers, particularly those with small flocks, may find it more convenient to prepare the premix in a bucket or drum. Other producers may find that it is cheaper and more practical to include a small mixer in their total feed mixing system.

- Producers using lucerne meal in laying rations should ensure that they buy only good quality lucerne — that is, freshly prepared, green and leafy. Store it in a cool, dry place out of direct sunlight. Lucerne meal loses its effectiveness for enhancing yolk colour the longer it is stored, particularly if it gets warm or damp or receives direct sunlight.

Lucerne meal can be added to the premix of egg yolk additives and other micro-ingredients. Unless the lucerne meal is of particularly good quality, some egg yolk additive will also have to be included. Lucerne meal varies greatly in quality and it is necessary to determine the correct amount of additive for each new batch. Use more egg yolk additive than is usually necessary and reduce the level in each subsequent mix until the yolk colour averages about nine on the Roche scale.

### Management

- Selective feeding by hens and particle separation in augers, silos, feed casts and automatic feeders can result in an uneven intake of egg yolk additive by hens and, therefore, a wide range in yolk colour readings. To avoid this problem, mix feed regularly, feed-up regularly and allow feed troughs and hoppers to be picked clean frequently. Do not allow feed to compact in troughs.

Excellent production can be achieved in cage units by feeding the birds at least daily and by allowing

the hens to pick the troughs clean by the time the next feed is due. In this way, each hen receives a properly-balanced ration and feed wastage is kept to a minimum.

- Replacement pullets must receive properly balanced layer rations from just before they begin laying. Experience has shown that it can take many weeks to raise egg yolk colour to a satisfactory level if the flock begins laying before it is given an adequate ration containing yolk additives. Unsatisfactory yolk readings can occur for consignments of eggs from mixed age groups of hens, and the whole farm could be penalized.

### Checking yolk colour

Check yolk colour frequently. Do not wait to receive an unsatisfactory notice on your egg grading returns before taking action. If yolk colour has fallen below the satisfactory level, it may take several weeks to bring it up to a satisfactory level and your consignments may be downgraded in the meantime.

Producers can check their yolk colour on the farm each week like this:

- find a place on the farm that is well lit but out of direct sunlight.
- break out 10 cracked eggs onto a white dish.
- see how many of the 10 eggs are 8 or better according to the Roche yolk colour tester — available free-of-charge from the Department of Agriculture and Fisheries, Poultry Husbandry Section, or from the S.A. Egg Board.
- if at least seven eggs are Roche No. 8 or higher, the yolk colour is probably satisfactory. The S.A. Egg Board's yolk colour reading is the official score and home testing is merely a guide.

Even when producers observe all the common sense rules, egg yolk readings may sometimes still be unsatisfactory. Here are some major points to consider.

### Feed consumption

Any of the following factors may cause a change in the amount of feed eaten by a hen, and, therefore, the quantity of yolk additive available for colouring.

**Energy level of the ration** — the higher the energy of the diet, the less feed hens eat. Egg yolk additives (and necessary nutrients such as vitamins and minerals) will have to be included at higher rates to compensate for lower feed consumption.

**Season** — hens eat less feed in warmer weather. Again, use higher levels of yolk additives.

**Diseases** — some diseases depress the appetite of the hen. Health problems such as worm infestations, which cause an increase in feed consumption, and coccidiosis, which impairs the ability of the gut to absorb nutrients, may both alter yolk colour. Treatment for some diseases may affect feed consumption and interfere with pigment absorption in the gut.

**Phase and restricted feeding programmes** — obviously these management practices will affect feed consumption. The level of yolk additives should be adjusted in the ration, as should other micro-nutrients.

### Rates of lay and egg size

An increase in the number or size of eggs means that yolk additives eaten by the hen have to be distributed in a greater volume of egg yolk. Rations may have to be adjusted as the flock approaches peak production and while a high laying rate is maintained. Conversely, the levels could be decreased during low production periods.

### Age and strain

As the hen ages, it lays heavier but fewer eggs, increases in body size, eats more feed and converts feed to eggs less efficiently. The net result can be changes in yolk colour.

Not all strains of hens produce the same yolk colour when fed the same feed. For example, white leghorn hybrid strains eat a lot less feed than other strains or crosses, and some strains convert feed with greater or lesser efficiency than others.

Variations between hens in the same flock (especially when body weight differs greatly) can result in large differences in yolk colour. It is possible that a consignment of eggs could be rejected because too many of the eggs fall below the required colour of No. 8 on the Roche scale.

### Egg yolk additives

For poultry rations based on grain and meatmeal, add Roche Carophyll Golden<sup>®</sup> to the ration at the rate of 22 g/tonne. Producers who wish to use good quality lucerne meal could use one of the following suggested levels of Carophyll Golden in combination with lucerne meal:

| Lucerne meal (%) | Carophyll Golden (g/tonne) |
|------------------|----------------------------|
| 3                | 20                         |
| 4                | 16                         |
| 5                | 12                         |
| 6                | 8                          |

Egg yolk additives based on Roche Carophyll Golden are distributed in S.A. by Scholz Chemicals Pty. Ltd. (Janos Higold), Red Comb Co-operative Soc. Ltd. and William Charlick Pty. Ltd. The active concentration in the products of each of the companies is different and the rates of inclusion in poultry rations are different.

To calculate how much yolk additive to add to one tonne of feed (1 000 kg) divide the level of Carophyll Golden required by the concentration of Carophyll Golden in the additive. The answer in kilograms (1 kg = 1 000 g) is how much needs to be added to one tonne of feed.

#### Examples:

- Janos Higold contains 200 g Carophyll Golden/kg. If 22 g Carophyll Golden is required for each tonne of feed,

$$\frac{22}{200} \text{ kg of Janos Higold is needed,}$$

that is, 0.11 kg or 110 g.

- Red Comb's additive contains 16.3 g Carophyll Golden/kg. To achieve 22 g Carophyll Golden a tonne,

$$\frac{22}{16.3} \text{ kg of Red Comb's additive is needed,}$$

that is, 1.35 kg or 1 350 g.

- William Charlick's additive contains 20 g Carophyll Golden/kg. To achieve 22 g Carophyll Golden a tonne,

$$\frac{22}{20} \text{ kg of William Charlick's additive is needed,}$$

that is, 1.1 kg or 1 100 g.

At present, no other yolk additives based on materials comparable with Carophyll Golden are available in a form suitable for producers who mix their own poultry feed. Producer-packs of products based on egg yolk pigments made by BASF in West Germany may become available soon in S.A.

## Y O L K   C O L O U R

The following are the levels of yolk pigments additives recommended by Dr. H. Karunajeewa of the A.R.I., Werrisbee to achieve the different colour levels indicated by the Roche Colour Fan.

The amounts of additive are grams of active Carophyll Gold (c/g) per tonne of mixed feed.

| Ration                                | Roche Colour Fan Reading |      |      |      |      |
|---------------------------------------|--------------------------|------|------|------|------|
|                                       | 8                        | 9    | 10   | 11   | 12   |
| No lucerne or maize (ideal)           | 20 g                     | 23 g | 28 g | 33 g | 38 g |
| No lucerne or maize (+ safety margin) | 22                       | 25   | 30   | 35   | 40   |
| 5% sun dried lucerne meal (SDLM)      | 15                       | 18   | 23   | 28   | 33   |
| 25% maize                             | 12.5                     | 15.5 | 20.5 | 25.5 | 30.5 |
| 5% SDLM & 25% maize                   | 7.5                      | 10.5 | 15.5 | 20.5 | 25.5 |

In the above table it is assumed that the Sun Dried Lucerne Meal contains 100 mg /Xanthophyll/Kg and that the Maize contains 30 mg/Xanthophyll/Kg. Also ideal conditions mean that the c/g is thoroughly premixed and that the total ration is well mixed. Also that an anti-oxidant is used and that the diet contains 4 - 5% of fat. The 4 - 5% fat level is normal for wheat/meat meal based diets but may be too high for diets in which peas or lupins make up a proportion of the protein supplements. If any or all of these ideal conditions do not apply you should add a safety margin.

It is worth while noting that poultry officers in N.S.W. recommend the addition of 50 g of active c/g to a ration without lucerne meal or maize to achieve Roche colour 10 (40 g of active c/g gives Roche colour 9).

The reasons for the different recommendations are not clear but emphasise the point that each farm is likely to have different requirements and that the above figures should be used as a guide only.

Also it seems that most local farmers are using more than the amounts

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recommended in the above table and would be unwise to make any alterations until they have achieved a stable yolk colour, unless the colour is too high.

As quite high levels of c/g are now being added it is most important that the feed is mixed well, otherwise there will be a greater risk of variation in colour and particularly of achieving dark colours.

Also it is important to monitor the colour of egg yolks by examining eggs daily under standard conditions either on a clear glass plate or failing that, a white dinner plate in good light.

The amounts (in grams) of available yolk pigments to add to achieve a number of grams of active per tonne are as follows:-

| Product                    | g/active c/g/tonne |       |       |       |
|----------------------------|--------------------|-------|-------|-------|
|                            | 20                 | 30    | 40    | 50    |
| Proton-Pharma-Carotene 200 | 100 g              | 150 g | 200 g | 250 g |
| Hi-Gold (Roche/Maag)       | 100 g              | 150 g | 200 g | 250 g |
| D.H.A. Carophyll Golden    | 135 g              | 200 g | 270 g | 330 g |

When calculating the amounts to add remember the following guidelines:-

Each 2% of maize is roughly equivalent to 4 g active c/g and thus

20% of maize will provide 40 g. active c/g.

Also 6% of good quality lucerne provides 40 g active c/g;

3% of " " " " 20 g " "

However as these products vary it would be wise to treat these figures with caution.

To Summarise:

1. Use a fresh good quality yolk pigmenter premix and store it in a cool place.
2. Weigh out accurately the amounts you need and make sure it is well-mixed into the ration.
3. Monitor your yolk colour carefully using good quality eggs in a good situation.
4. When you have achieved a stable colour you can then vary the amounts of yolk pigmenter accordingly.

RAY EVANS, DIST.EXT.OFFICER