# AGRODOK 33

# DUCK KEEPING IN THE TROPICS

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# FOREWORD

Ducks are tough animals and good scavengers. They are easier and cheaper to keep than chickens. This makes duck keeping for the production of eggs and meat an attractive enterprise.
Agromisa and CTA have produced this Agrodok in order to support people in improving their daily livelihood. This can be done either through income generation from a small-scale duck keeping enterprise or through improving the daily diet with duck eggs and meat.
We hope that many people will benefit from this Agrodok.

We are grateful to Mr Buisonjé of the Spelderholt Institute in Beekbergen, the Netherlands. Being an expert on poultry and duck keeping he has provided valuable information and practical knowledge. We have appreciated the time and effort he has put into improving the contents of this Agrodok.
The Agromisa co-workers Barbera Oranje and Pepijn Dengerink finalized this publication. Barbera took care of the illustrations and Pepijn did the final work: the lay out. We thank them and also others who we can't all mention here, for putting their time and effort in this Agrodok.

Rienke Nieuwenhuis, editor

Marg Leijdens, co-ordinator Agrodok Publications

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# 1 INTRODUCTION

This Agrodok covers a number of subjects which arise if you yourself, or people you work with, are considering keeping ducks. The aim is to give practical advice on small-scale duck keeping for those who work directly with small-scale farmers. A theoretical background is given in order that users of this book are able to develop the most suitable practices for their particular situation.

## 1.1 Basic facts about duck keeping

About 700 million ducks are kept around the world. The majority of these, more than 500 million, are found in Asia. Despite this uneven distribution, it is certainly also possible to raise ducks in other parts of the world, including Africa and Latin America.

Ducks can be reared for eggs and meat, for own use or for sale. Other products from ducks, which can also be sold, include down, feathers and fattened livers (foie gras).
There are many similarities between chicken and duck rearing. The most obvious similarities are found in the type of products for which these forms of poultry are kept. Ducks, like chickens, are good producers of eggs and meat. Breeding is largely similar for both. Ducks have approximately the same housing requirements as chickens, especially when they only require night shelter. If the ducks are outside during the day, just like chickens they will be capable of searching for a large amount of their own food.

### *Advantages of ducks compared with chickens:*

- Ducks are tougher than chickens; they require less attention than chickens and are less likely to be sick than chickens.
- Ducks are larger than chickens, so if they are reared for meat there will be more to sell. Duck eggs are also larger than chicken eggs.
- Ducks do not necessarily need supplementary grain and maize. Chickens normally do need supplementary high quality feed. Ducks eat more vegetable material and insects than chickens. Ducks also eat snails. S o they find their nutritious supplements by themselves.

*Disadvantages of ducks compared with chickens:*

- Both duck meat and eggs taste different from those of chicken. Not everyone likes the taste of duck. If the taste is disliked by a lot of people it will be difficult to sell duck products. Not only does duck meat taste different it also looks different from chicken meat. Chicken meat is white whereas duck meat is red and dark. Lastly, duck meat is also fattier than chicken meat. Although this is listed here as a disadvantage that is not necessarily the case. In many areas fatty meat is considered a delicacy.
- Ducks are water birds and need water to be able to breed and grow well. A pool or pond of water can take up a lot of room. A trough of water can also be provided so that ducks can bathe. If it is not possible to keep ducks near water the whole day it is sufficient to place a tub of water out for them in the mornings and evenings so that they can wash. Pools, ponds, troughs or tubs of water all need to be kept clean and hygienic. Different sorts of ducks differ in their water requirements. Muscovy ducks (sometimes called Barbary duck) have less need to cool themselves and so have less need for a constant supply of bathing water. Peking ducks come originally from colder climates and live near to water. These ducks need water to keep their body temperature at the right level.

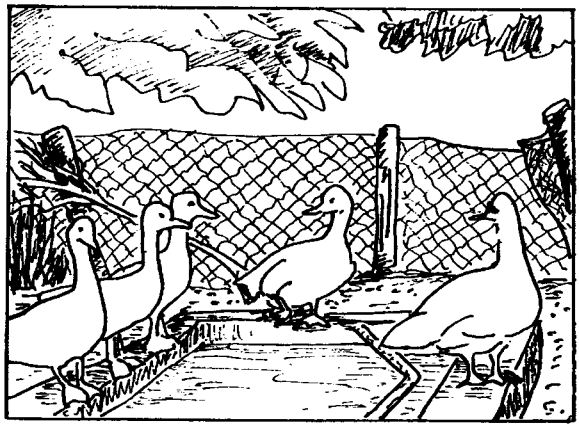


*Figure 1: Ducks near a pond of water (source: CICUTEC)*

## 1.2 Points to remember

There are many ways of raising ducks. The simplest method requires little capital input, where ducks are raised in the farmyard as part of a mixed farm. This is the so-called free-range system. At the other extreme, large-scale, capital-intensive duck rearing can take place on a farm on which only ducks are raised inside a covered shelter or confined indoor system. Between these two extremes there are many different forms in which the ducks are offered an indoor shelter and a run in which they can go outside as well, these are semi-confined systems.
In these systems checking the condition of the ducks is easier than in a free-range system but the necessary investments are not as big as in a fully confined system. This is the kind of system Agromisa would like to propagate as a way towards more profitable small-scale duckkeeping.

In order to decide how to raise ducks, a farmer or extension worker needs to consider a number of points:

- Are the ducks intended for your own use or do you also want to sell a duck product?
  If you are considering keeping ducks in order to sell their products it is important to know whether there is a market for the eggs or meat.
- Will duck rearing fit in with the rest of your activities? Do you have room for ducks?
  Not only do you need room for shelter and a water supply for the ducks, but their daily care also takes time and may get in the way of other activities.
- Where will you get your ducklings in order to maintain a stock? Will you breed yourself or will you buy ducklings when you need them? If you plan on buying them, can you be sure that there will be a regular supply in the future?
  If a trader or breeder cannot guarantee that ducklings will be available in the future, you have to consider breeding ducks yourself. Can you provide the time and care to do so?
- What will you feed the ducks? Where can you obtain feed? Do you have sufficient food available on your own farm or will you have to buy some types of feed?
  Ducks are capable of scavenging for a large amount of food themselves, but it is often necessary to give them some extra. If ducks

are free-range they are more likely to suffer from a shortage of vitamins or minerals.

## 1.3 Outline of this book

*Chapter 2* describes different types of ducks with their different characteristics, which make them suitable for different purposes. Once you have ducks, maintaining the flock is important. This can be done through hatching out your own eggs or buying ducklings regularly and raise them. Important factors and ways how to incubate eggs and raising ducklings are treated in *Chapter 3*.
*Chapter 4* describes three systems of duck keeping: free-range, semi-confined and confined. Two integrated systems are highlighted: duck keeping in combination with rice cultivation and with fish farming.
Chapter 5 is about housing for ducks. Different types of shelter are described, the dimensions required, as well as feeding and drinking trays.
*Chapter 6* describes some basic aspects of preventive health care, hygiene of the housing and the surroundings being the most important factor. Ducks are basically quite tough animals, but for the occasional time when they do become ill, the most common diseases are described.
*Chapter 7* covers feed. Although ducks are good scavengers, you can often obtain better production levels by supplementing their feed. The different requirements of egg and meat-producing ducks are outlined in this chapter.
Ducks are most often raised for their eggs and/or meat. *Chapter 8* provides an indication of the levels of production you can expect to achieve. Care of the products is also discussed in this chapter.
*Chapter 9* provides a reminder of the fact that if you keep a record of what happens on your farm it is easy to have an overview and to improve management.

Of course all farms differ from each other, although there are often similarities with others in the same area. For this reason you should consider this Agrodok as a handbook in which several possibilities are presented. You have to decide yourself what is possible and suitable for your own situation and what improvements you can make.

# 2 BREEDS AND BREEDING

## 2.1 Breeds and choice of breed

When starting with duck rearing you need to acquire ducks. This is when you will choose a breed:

If there is a choice of breeds available then you need to consider what your production objectives are: eggs, meat or both. If you decide to rear ducks for egg production then you need to have good laying ducks. These are usually smaller and lighter than birds reared solely for meat production (for fattening). They make up for their lack of growth and weight by being better layers: on average laying ducks lay more eggs than ducks for fattening. Ducks for meat (broilers) are generally larger and heavier, and the number of eggs they lay is of less importance. Ducks for meat are very often slaughtered before they have even reached the age at which they can produce eggs.

In many forms of farming, especially small-scale farming, *egg production as well as meat production* will be important. A duck that is a good layer but also can produce a nice amount of meat is best for this kind of farming. As mentioned above, you may not have a choice of breed. In this case you simply use the duck breed which is easiest to come by.

However, in many areas there will only be one breed of duck which is suitable for rearing. The advantage to using locally available ducks is that you can always obtain them if you need to replace or increase numbers. It may be worth considering obtaining stock from another area or even importing ducks from another country. This is of course not possible for all farmers, but it may be a possibility in some cases.

Duck keeping is more common in Asia than in Africa or Latin America, which means that there are more different breeds available there. Each breed of duck is well adapted to the conditions in the area from which it originates. This does not mean that a breed that is a good layer in Asia will automatically be a good layer in Africa as well. If ducks are given a kind of feed in Asia which is not available in Africa the egg production may be less in Africa.

Below a number of breeds are described. Although the descriptions are fairly general, the most typical characteristics of each breed are listed.

## *The Muscovy or Barbary duck*

This duck comes originally from Central America. The Muscovy duck is good for meat production. It is easy to recognise by the red, fleshy protuberances around the beak and eyes. It is important to know that the Muscovy duck is originally a tree dweller and therefore can fly. In order to prevent these ducks from flying away their wings need to be clipped.

*Fig. 2A: Muscovy duck (Source unknown)*

A Muscovy duck used for fattening can reach a weight of 3 to 5 kg. The Muscovy duck does not grow very quickly and its final weight depends on the way it is kept and the feed it gets. The meat of the Muscovy duck is fairly lean. In areas where fattier meat is preferred then it is probably better to choose a different breed. The Muscovy duck starts laying eggs at about 7 months. There are two clear laying periods; the first lasts 30 weeks and the second 22 weeks.

## *The common duck: group of various breeds*

This group includes various breeds, which originate from Asia and have been imported into Africa. The most important include:

➢ *Rouen duck*: a reasonably good layer. The drake (male) is light grey with a green neck and the female is light brown.

➢ *Khaki Campbell duck*: a khaki (beige) coloured duck. This is a good layer which is a cross between the Indian runner and the Rouen duck. Although originally a cross-breed it is now recognised as a breed in its own right. The Khaki Campbell is well suited to a tropical climate. Under good conditions this breed is capable of laying up to 250 eggs per year.

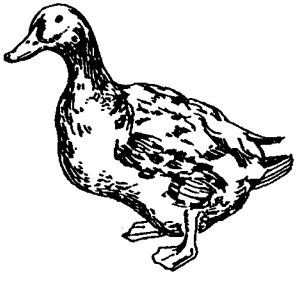


*Fig. 2B: Khaki Campbell duck (Source unknown)*

## *Peking ducks*

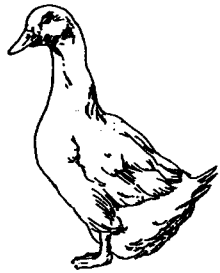


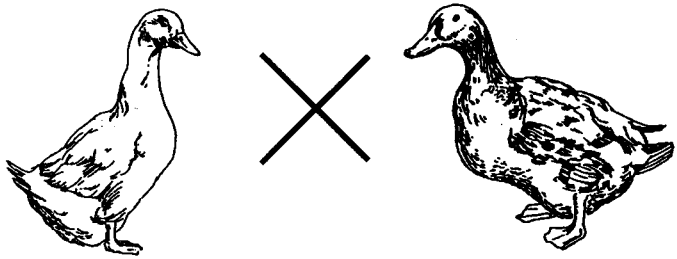
*Fig. 2C: Peking duck (Source unknown)*

A completely white duck which originally comes from China. This breed is a typical meat producer like the Muscovy duck. The Peking duck grows a little quicker than the Muscovy duck. One of the characteristics which indicates that the Peking duck is good for meat production is that it can reach a weight of 3 kg by the age of 7 - 9 weeks. Drakes usually attain a maximum weight of 3.5 - 4 kg and females 3 - 3.5 kg. Peking ducks lay eggs from an age of 5 months and can lay up to 120 eggs a year. This breed comes originally from a cool climate. Peking duck meat is quite fatty, unlike that of the Muscovy duck. It is a quiet breed that tends to walk rather than fly.

## *Cross-breeds*

Breeds are regularly crossed in an attempt to obtain a combination of good characteristics of two different breeds. Sometimes the results of cross-breeding are used for further breeding themselves, sometimes new crosses are made each time. There is a number of standard cross-breeds:

➤ A Peking drake is crossed with a female Khaki Campbell. This is a cross between a good meat producer and a good layer. In this way the cross-breed should combine good meat production with good egg laying. First and second generations (referred to as $F_1$ and $F_2$) are used quite commonly. Further generations are not generally used, as the improvements obtained by crossing usually start to decline by that stage.



*Peking drake* *Female Khaki Campbell*

➤ The mule duck is a cross between a Muscovy drake and a female common duck. As these are two different species the resulting mule duck is sterile and does not lay fertile eggs. The mule duck is a quick fattener and is used especially for this purpose.

## *Other breeds*

In addition to the breeds described above there are many more breeds and crosses. These include:

- Indian runner duck (from India)
- Nageswari (from India)
- Chinese duck (from Indochina)
- Java duck (from Malaysia and Indonesia)
- Brown Tsaiya (from Taiwan)

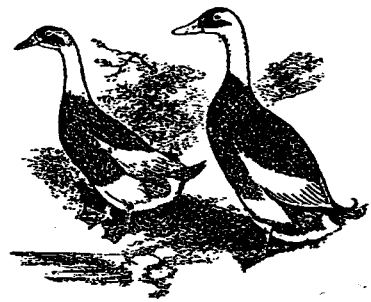


*Fig. 2D: Indian runner ducks (Source unknown)*

Most duck breeds come from Asia and are kept for egg laying. These breeds are therefore generally not very large, the adult weight being between 2 and 3 kg.

## *Variety in production*

All breeds have different characteristics in terms of egg production, growth rates and survival rates. Where production figures are available these should be used only as guidelines to help you make decisions. The figures will depend very much on the local conditions where they were collected. More detail on production figures can be found in Chapter 7.

If there are farmers in your area (or in other areas with similar conditions) who already keep ducks, it is worthwhile going to look at how they are rearing the ducks and for what products. This will give an idea of the results you can expect.

## 2.2 Breeding

Once you have obtained a number of ducks of the selected breed, you need to consider how you will maintain the number of productive ducks over a longer period.
If you keep ducks purely to sell their eggs and you buy ducklings whenever you need them, you will only need female ducks.
If you intend to breed your own ducks then you need drakes as well to ensure that you have some fertile eggs. If you are keeping ducks for meat you have to make sure that you keep enough adult ducks for laying eggs so that you have a supply of ducklings.

**Advantages** of breeding ducks yourself are:

- You are not dependent on other suppliers of young ducks.
- You don't have to spend money on buying ducklings.

**Disadvantages** are:

- You have to incubate eggs, which cannot be sold. You have to spend time and money on incubating eggs.
- The effort of incubating eggs may be wasted if they don't hatch.
- Although you want only eggs, you will have to keep and feed unproductive drakes (males) as well, in order to obtain fertile eggs.

For small-scale farmers it is more profitable to breed ducks themselves especially if the numbers of ducklings they need are small.

### *Two ways of breeding*:

- *Free breeding*

If you keep the female ducks and drakes together then getting fertile eggs or ducklings will usually be no problem. The drakes are free to mate with any duck they want. However, in this way, you will have no idea of which drake has fertilised which ducks.

➤ *Directed breeding*

You can also direct the process yourself so that you combine the ducks with the most desirable characteristics. In this way you keep ducks especially for producing ducklings, these are known as breeding stock (see next section).

The extent to which you can determine which drake pairs with which duck depends on how you keep your ducks. If the ducks are only kept inside at night but are allowed to wander around freely at daytime in search of food then it is very difficult to even know which duck has paired with which drake. If you keep ducks in this way it is not worth spending much time trying to determine partner choice. The best thing to do is to put a number of good drakes into the flock and let them go their own way. This is the most simple and natural way of ensuring that you will have ducklings.

If you have more possibilities and time then you could consider making separate sections in large shelters, so that you can put one drake together with a number of ducks (4 - 8) so that they can mate. This requires more space and housing materials.

## 2.3 Breeding stock

As stated before, breeding stock are ducks with desirable characteristics which you like to see in the ducklings. For example you may choose to combine a drake that grows well and has a good amount of meat, with a duck that is a good layer. Bear in mind, however, that not all characteristics are passed on from the parent duck to its offspring, but generally speaking the chance of breeding good ducklings is greater if good parents are used. Characteristics that you are looking at can be production characteristics or external characteristics.

➤ *Production characteristics*

Most of the characteristics which are related to production are about quantity: the number of eggs, the weight of meat, etc. An important feature of these characteristics is that the environment influences them. These you can influence yourself as duck keeper. A duck which is bred for high meat production will only be able to achieve high production

levels if it gets enough food. If it is fed less than it requires, then it will not reach the maximum weight that it is capable of reaching.

If you want to increase your production levels you should first look carefully at your food supply, sickness levels and housing. Once you have made sure that you have the best food available, and that your ducks are healthy and have good housing, then you can start breeding for a purpose.

➤ *External characteristics*

Above we have discussed selection for production characteristics. External characteristics may also be important, such as foot quality. If a number of ducks in a flock have bad feet it is better not to use them for breeding as they can pass this characteristic on to their young. External characteristics are not influenced by the amount of feed or housing. A duck will either have straight feet or not, or brown colour or not, so it is easy to use this kind of criterion for selection.

## *The management of female ducks and drakes*

To ensure that you have enough fertile eggs, a good ratio is one drake to six female ducks, although you can go as high as eight female ducks to one drake.
If you have less female ducks per drake the chance of fertile eggs increases, but less than four female ducks per drake is not recommended. A relatively large number of drakes in a flock makes the whole flock restless. It also means that you have more drakes that eat and require care but are not productive, unless you can sell them when slaughtered.

Try to introduce drakes into the flock about a month before you require fertile eggs. This ensures that enough pairing has taken place for the ducks to lay fertile eggs. The first few times that ducks mate the eggs may not be fertile.
It is often thought that mating can only take place on the water. This is not strictly necessary, but it is a good idea to give ducks access to water in the form of a pond or a puddle of clean water, or even just a large container with water in it. Ducks are water birds and they can keep themselves clean (and therefore more healthy) if there is water in which they can bathe or swim.

This is not so necessary for Muscovy ducks as these are originally tree-dwellers. Remember that water can be a source of disease and vermin. Brooding ducks that can keep themselves clean are better able to maintain the right level of humidity for the eggs.

## 2.4 Maintaining a flock

There are two ways of obtaining and keeping a flock of ducks with the best possible features. Both methods should be practised at the same time:

1) Selecting ducks and drakes for breeding (see above)
2) Culling (removing) unhealthy ducks or low producers

Culling means: removing from the flock. Dispose first of ducks that are so sick that you can no longer treat them or that are not worth treating (see chapter 6 for more information on health care). It is also worth getting rid of ducks which have already gone through several laying cycles and are not so productive any more. This makes place for younger ducks.
Once this has been done, further culling will be of ducks that possess undesirable characteristics: those that do not produce enough. Do not breed using ducks that are bad layers or do not fatten well, as there is a chance that they will pass these characteristics on to their young.
The decision when to cull, especially older ducks, will depend largely upon when new ducklings are available.

There are three different ways to practise culling. These are described below.

### *Culling systems*

➤ *Continuous system*:
In this system a few new ducklings are added regularly to the flock. The ducks are not separated into age groups as there are no clear age groups. Besides watching for sick ducks you also have to keep an eye on the older ducks and remove them once they become unproductive.

- *All-in-all-out*:
  The whole flock is renewed at regular intervals. In this system you do not have to check which ducks have become too old as all ducks are the same age. You should still check for sick ducks and remove them immediately. If you use this system you will often have different groups of ducks at different stages of production. This way you avoid being a situation where you have no ducks (and therefore no production) at all.

- *Semi-continuous*:
  This refers to any system which is not clearly continuous or all-in-all-out. For example, you may check regularly for ducks which need to be culled, but once every couple of weeks you hold a 'big cleanup'. This is when you check each duck more carefully to see how they are doing.

How many ducks you can cull will depend on the number of ducklings you can raise with each laying cycle. You have to be careful that the number of the flock does not decrease too much if you want to maintain your production at a constant level; if you remove more than you can replace your production will go down. If you want to increase your duck keeping you have to ensure that you can replace more ducks than you remove.

# 3 INCUBATING EGGS AND RAISING DUCKLINGS

Before fertile eggs are laid you need to decide whether the duck herself will incubate them or whether you will use an artificial incubator. If the duck is going to incubate the eggs herself, the nest needs to be ready in time to give the duck a chance to get comfortably installed on it. She will take care of the eggs and you don't have to worry much because the duck will make sure that the circumstances are right for the eggs.

If you choose to use an artificial incubator, you need to have it ready in time and cleaned for the eggs. You then need to keep a close watch on the temperature and humidity in the incubator. It is very difficult to make the conditions in an incubator exactly the same as those of a duck herself. It requires technical equipment, which has to be used accurately. Unforeseen occurrences such as an electricity failure or running out of fuel can lead to disaster. For this reason you need to consider carefully the advantages and disadvantages of natural versus artificial hatching for your own farm; what are the costs (not only in money, but also time) and what are the expected returns?

## 3.1 Incubating eggs the natural way

Hatching eggs the natural way means that they are incubated by a duck. The big advantage to this method is that the eggs require little time and attention. The most important requirement is that the duck that is going to incubate the eggs is sufficiently broody. Being broody means having the urge to stay sitting on the eggs until they hatch. You can tell whether a duck is broody or not by how long she remains sitting on the eggs. The eggs cannot be left alone for long as they must not cool down too much. If they cool down too much the ducklings cannot develop.

Most ducks will sit on their own eggs. However, it is also possible to let one duck from the flock sit on eggs which have been laid by several ducks. In this way about 12 eggs, which were laid at the same time, can be incubated by one duck.

The Muscovy duck has good maternal instincts and can therefore also be used for incubating the eggs from other types of duck. The Muscovy duck is also larger than many other types, so it can incubate more eggs at once. You will have to see how many eggs fit underneath a Muscovy duck, but 12 - 15 should fit easily.
Chickens can also be used to incubate duck eggs. Because duck eggs are larger than chicken eggs a chicken will only be able to incubate 8 - 11 duck eggs at most.

## 3.2 Hatching eggs in an incubator

An incubator is a box with trays inside on which the eggs can be put. An incubator must be able to take the place of a female duck. It must keep eggs at a constant temperature and right humidity. Some small holes are necesary in order to allow enough fresh air inside without losing all warmth inside.
Incubators come in many different shapes and sizes, it is possible to make a small scale incubator yourself. Using incubators and making them is described extensively in Agrodok 34 'Hatching eggs by hens or in an incubator'. Although the Agrodok is mainly about chickens, much of what is written also applies to ducks. The text indicates where ducks have different requirements. Figure 3 shows an example of a simple incubator.

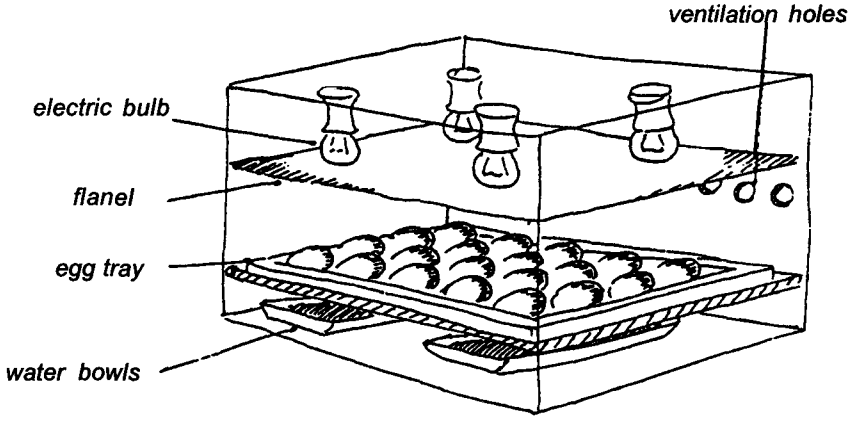



Figure 3: A small incubator (Source: Agrodok 34)

## *Heating and temperature*

Eggs being incubated must be kept warm. The best temperature for incubation is 38° C. The heat source used inside the incubator (electric light or oil lamp) must heat the whole incubator evenly. The eggs are laid on a tray or in containers in the centre of the incubator. You can check the temperature by hanging a thermometer close to the eggs. The temperature needs to be about 38°C (see Table 1).

*Table 1: Artificial incubation of duck eggs*

| Day in incubation period | Temperature | Number of times to turn per day |
|---|---|---|
| 01 - 24 | 38 | 5 |
| 24 - 26 | 38 | 5 |
| 26 - 28 | 37.5 | 0 |

If the temperature is lower or higher the duckling will not develop properly. At best the ducklings develop too slowly but will hatch. In the worst case, the ducklings die before they hatch.

## *Humidity*

An incubator needs good ventilation and must be able to maintain humidity. The air humidity must be quite high, although at the beginning of the incubation period it must not be too high. This is because part of the moisture in the egg needs to evaporate, otherwise the embryo will drown in the egg fluid. If it is too low at later stages it may result in eggs becoming too dry. Egg shells contain many small holes, which are not visible to the naked eye. The eggs can regulate the amount of fluid they contain by means of these holes.

You can control the humidity by putting a bowl of water in the incubator. If the water evaporates very quickly then place a larger container of water in the incubator. If you notice when you turn the eggs that the moisture from the bowl is evaporating too slowly then remove the bowl of water from the incubator or increase the ventilation.
The day before the eggs hatch the air humidity has to be increased by spraying the eggs so that the ducklings do not hatch into too dry surroundings. The ducklings also need fresh air, which is why there must be air holes in the incubator.

### *Length of incubation:*

Nearly all types of ducks take about the same amount of time to hatch their eggs. Generally duck eggs need to incubate for between 25 and 28 days before they hatch. You can expect most breeds to take about 28 days. Muscovy duck eggs take longer to hatch - about 35 days, and Mule duck eggs usually take about 32 days. If incubation takes longer than 4 - 5 weeks then there is probably something wrong with the eggs: either the egg was not fertilised or the egg died during incubation.

## 3.3 Advantages and disadvantages of incubating eggs artificially

### *Advantages*

- A lot of eggs can be incubated at the same time. May be even enough to allow you to sell day-old ducklings to others.

### *Disadvantages*

- Investments are needed to buy an incubator;
- Time is needed to vigilate the process, to make sure the temperature and humidity are at the right levels and that nothing goes wrong with the heat supply;
- In case you choose an electrical heat source, powercuts can easily result in a disaster;
- Artificial incubating requires experience, especially in the beginning the risk of eggs not hatching or ducklings dying is very big.

*Conclusion*

If you don't incubate more than 100 eggs at a time it is not worth risking so much.

In most cases you are best of letting the female ducks do the job they are very good at: incubating their own eggs and taking care of their own ducklings.

## 3.4 Caring for the eggs before and during incubating

Check the eggs before you put them in the incubator. Throw away broken, misshapen and very dirty eggs. You cannot yet determine whether the eggs you keep have been fertilised. You have to wait until the embryo has started to develop and becomes visible. After about seven days of incubation the embryo is large enough to see.

You can check whether the embryo in an egg is alive by holding the egg up to the light. In order to be able to see the embryo in the egg, place the egg in the end of a tightly fitting tube. Look through the tube and hold it up towards a bright light source (the sun, a good lamp or a bright candle).
You can also use a viewer like the one shown in figure 4.

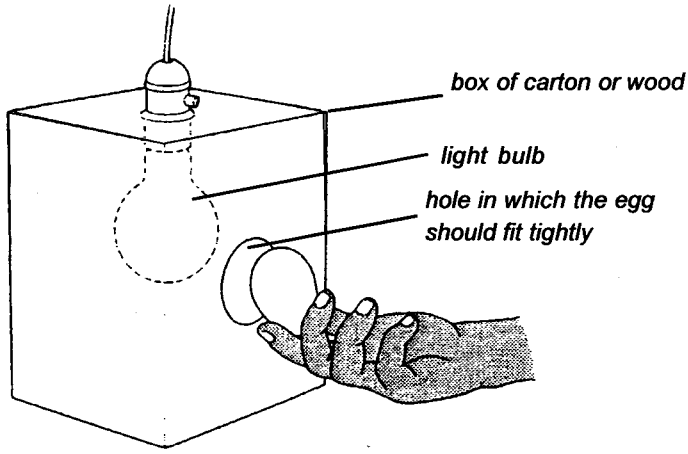



*Figure 4: Viewer (Source: Smith, 1992)*

There are three occasions when you should check eggs for problems:

- ➤ *before incubation,*
  check for cracks in the egg shell or misshapen eggs.
- ➤ *after 5 - 7 days of incubation,*
  the embryo should be clearly visible at this stage
- ➤ *after 18 - 19 days of incubation,*
  a uniformly opaque coloured germ should fill the egg.

> When the duck incubates the eggs herself, you should not check the eggs any more after 18 days of incubation. The duck or chicken can be left undisturbed to let the eggs hatch.

If you find eggs, which are not developing normally or in which the embryo is dead, then they must be removed from the nest or incubator. If an egg looks strange, mark it so that you can look at it carefully the next time you check the eggs. Figure 5 illustrates the stages of development which should be visible when checking the eggs.

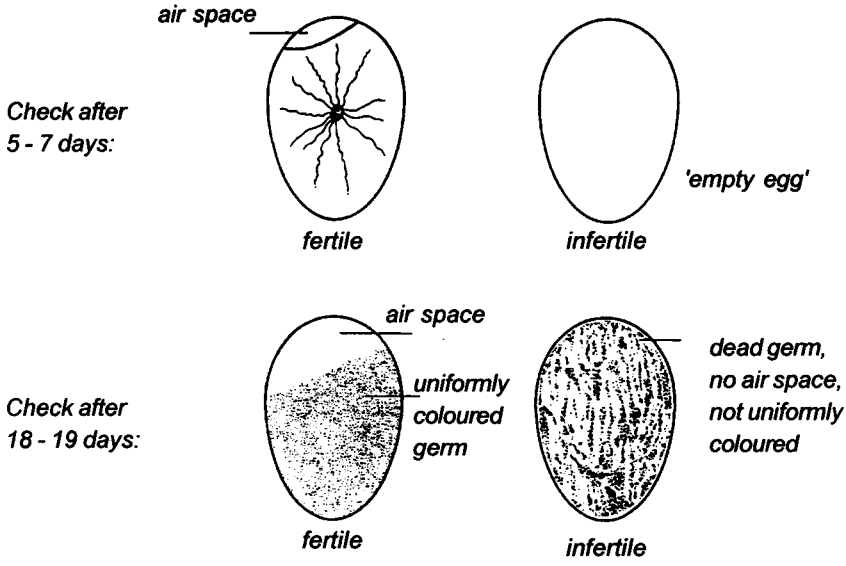



*Figure 5: Stages of development of an egg from the start of incubation (Source: French, 1982)*

*Checklist for incubating eggs*

- Use freshly laid eggs. Collect the eggs to be incubated from the nests. Do this once a day as ducks only lay their eggs in the morning. If you collect them at nine o'clock in the morning it may be worth looking again an hour later just in case some ducks lay later.

- Select the best eggs. Look for good size, shape and shell structure, and choose only clean eggs. The eggs which are the best shaped are usually the ones with the greatest chance of hatching.

- If you want to incubate many eggs at the same time you can collect them over a period of time. Eggs for incubation must be stored at a temperature of 13 - 16 °C, for a maximum period of 7 days.
  If you store the eggs at a temperature below 13 °C the embryo will die. If the eggs are stored at a warmer temperature, between 16 and 38 °C the duckling will start to develop but the process goes so slowly that the duckling will die in the egg.
  If you store the eggs for longer than 7 days the number of eggs that will hatch decreases rapidly.

- Clean the dry eggs with a dry cloth, or carefully scrape any dirt off with a knife. Do not clean the eggs with water as it can soak through the porous eggshell. This is not good for the development of the embryo. Dirt and diseases can also get into the egg in this way. Clean eggs are less likely to become sick.

- Put the eggs all together at the same time in the incubator or under the mother duck.

- Turn the eggs each day, and from the third day turn them 5 times a day (see Table 1). A mother duck will do this herself, but in an incubator you have to do this by hand. Turning the eggs stimulates the development of the embryo.

## 3.5 Selection of the ducklings

The time of hatching is an important moment at which you have to be present. At this moment you can take out the late hatchers because these are likely to be less productive when they are mature. They will not be as strong as the ducklings which hatched earlier.

Sexing can also be done at this moment so that you can separate the drakes from the female ducks and may be able to sell them as day-old ducklings. The method for sexing at this stage is described in Section 3.7.

## 3.6 Caring for the ducklings

Ducklings, which have been incubated naturally, require little extra attention. The duck which hatched them will look after them until they are old enough to look after themselves.

Ducklings from an incubator do need extra attention after hatching. You need to pay attention to warmth, water and feed. Once about a third of the eggs have hatched you have to remove the ducklings from the incubator and put them in a closed space with a warm lamp. The rest of the hatched ducklings can then be added half a day later. Any eggs that still have not hatched after that time should not be used for production.

### *Warmth*

Newly hatched ducklings cannot maintain their own body temperature so you have to keep them warm. The easiest way to do this is to keep them in a confined space and hang a lamp above for warmth. You can keep them under the lamp (where it is warm) by bending a flexible board around the ducklings in a circle (see Figure 6).

You can tell whether the ducklings are too warm or too cold by how they behave. Figure 6 illustrates how ducklings react to the warmth of the lamp. When they huddle close to each other they feel cold (Figure 6A): the warmth of lamp is not close enough. You can bring it closer by hanging it lower. If the ducklings are still too cold then you need a stronger lamp. If this is the case it might help to hang up two lamps.

When the temperature is too high the ducklings will try to get as far away from the lamp as they can (Figure 6B). If this happens hang the lamp higher. If the ducklings move freely throughout the cage (Figure 6C) then the temperature is right for them.

When ducklings hatch they need a temperature of about 30 - 32°C. In colder areas you can reduce the temperature by 1°C each day. Peking ducks tolerate temperatures of 10 - 15°C. Muscovy ducks from a warmer climate, require a temperature above 20°C.

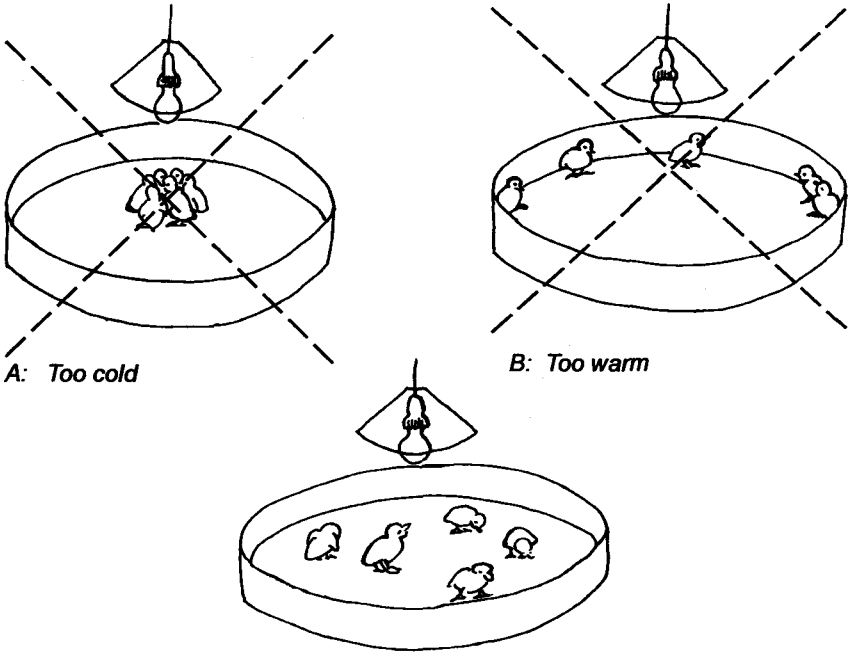



*Figure 6: Reaction of ducklings to heat source (Barbera Oranje)*

## *Drinking water*

The presence of drinking water is very important for ducklings. There must be sufficient, clean water present, otherwise the ducklings will become sick.
You have to make sure the ducklings do not try to swim in their drinking water. This not only makes the water dirty, but it can also make the ducklings sick. Adult ducks have a layer of fat over their feathers which prevents the feathers from getting wet. In a natural situation a mother duck will also rub fat into the feathers of the ducklings that she has hatched herself.

The feathers of ducklings from an incubator do not have fat over them to begin with. Ducklings cannot rub fat into their own feathers until they are about three weeks old. This is not a problem as long as they do not try to get into water. You can stop them from sitting in the drinking water by putting stones in the bowl or putting chicken wire over the top.

### *Feed*

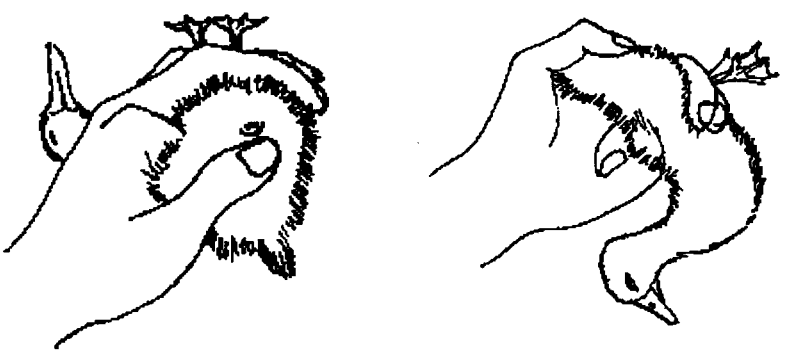
Newly hatched ducklings need special feed. You can buy this or prepare it yourself. There is more information about feeding ducklings and preparing feed in Section 7.5.

## 3.7 Sexing ducklings

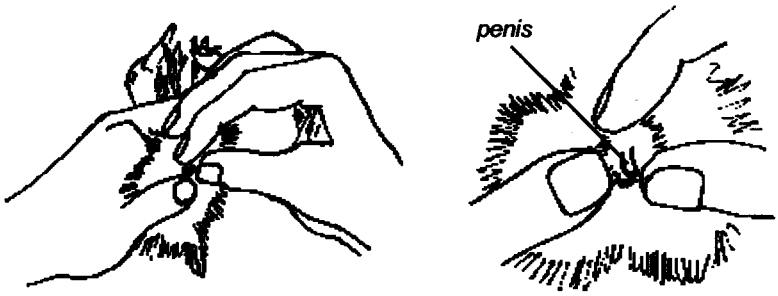
It is useful to know what sex the ducklings are in order to be able to separate the ducks from the drakes. This will make your production more efficient. If you sex newly hatched ducklings you can sell the drakes as day-old ducklings.

### *Method for sexing newly hatched ducklings*

Once the ducklings have dried after hatching you can sex them.
By holding the duckling as shown, it is easy to see whether or not it has a penis.



*Way of holding the duckling*




*Press thumb and first finger tightly together over vent.*
*The part them slowly so that the vent is fully extended and exposed.*

*Figure 7: Sexing newly hatched ducklings*
*(Source: B. Jackson in MacDonald, 1985*

It is easier to do this with ducks than with chickens and after a little practice you will become better at this. This method is vent examination.

## *Methods for sexing at a later stage*

If you want to rear the ducklings until they have been fattened and then sell them you can also use one of the other methods:

- *Watching the colours of the feathers*
  Ducks and drakes of some breeds have different colours which makes it easy to tell them apart.

- *Voice*
  There is a clear difference in the noise made by ducks and drakes. This is noticeable from about 4 - 6 weeks of age. A female duck makes a clear 'quack' sound, while a drake makes a deeper and more hoarse sound.

- *Tail feathers*
  The tail feathers of most fully-grown drakes have a clear curl at the end. Female ducks do not have this. The only breed that does not show this distinction is the Muscovy duck. However Muscovy drakes are much bigger than the females, so it is also easy to determine sex in this breed.

# 4 DUCK KEEPING SYSTEMS

There are many ways in which you can keep ducks. In Section 4.1 we describe three main systems of keeping ducks, to give you an idea of the possibilities. In practice farmers can adapt these main types to their own needs and the materials available.
Duck keeping combines well with other forms of farming. Section 4.2 covers two well known integrated systems: duck keeping combined with rice cultivation and duck keeping combined with fish ponds. In these systems the different forms of production complement each other and the farmer will have better production and more profit:

- Waste and by-products are used, e.g. duck manure is used instead of wasting it: in fishponds it is directly used for fertilizing the pond which increases fish food; in rice fields ducks eat harmful insects and snails, this is a help for the rice and at the same time the ducks get nutritious food.
- Certain inputs are used more efficiently, e.g. one fishpond is used for fish and for ducks at the same time. Ducks grow better if they live in a pond.
- The farmer spreads risks. For example if the rice yield is low there is still a yield of eggs and duck meat.

## 4.1 Duck keeping systems - extensive and intensive

### *Free-range system:*

The ducks are only kept inside at night. During the day the ducks are free to roam outside in search of food. They are brought inside at night by putting some extra food in the shelter. The ducks only require night shelter and nests for laying eggs. Building and maintenance costs are lower than in a (semi-) confined system because the ducks are outside during the day. It is more difficult to keep an eye on the ducks if they roam freely than if they are kept in shelters the whole day. An advantage of this system, however, is that the ducks look for most of their food themselves.

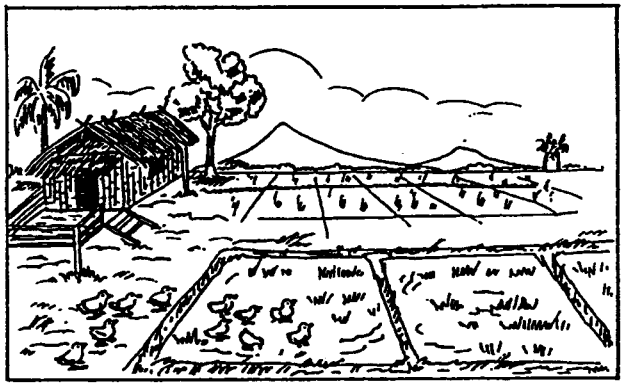


*Figure 8: Free-range housing system*
*(Source: Meinderts, 1986)*

## *Semi-confined system:*

The ducks are kept in a confined area consisting of a covered shelter and an open run. The advantages are the same as for a confined (indoor) system. The ducks stay in the same place, which means it, is easy to keep and eye on them and check them. The outside run makes it easier to give the ducks access to water, as a pond can be put in the open run area.

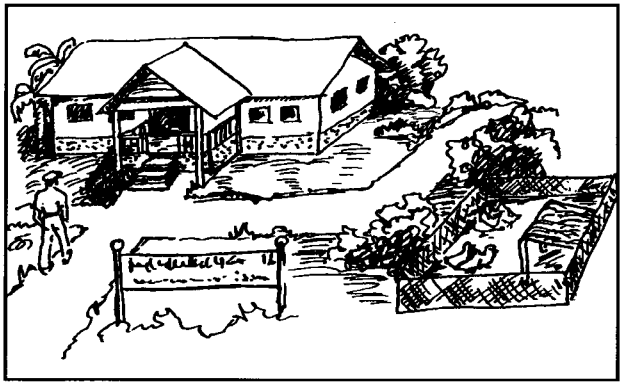


*Figure 9: Semi-confined housing system*
*(Source: Meinderts, 1986)*

## *Confined (indoor) system:*

The ducks are kept permanently in a covered shelter or shed. This system is mainly used in large-scale intensive duck farms. It enables you to watch the ducks easily, so that selection can be done quickly when necessary. The *confined* system requires more investment than the other two systems of housing. Not only do you need to build the shelter, but you also have to provide feed and water containers.

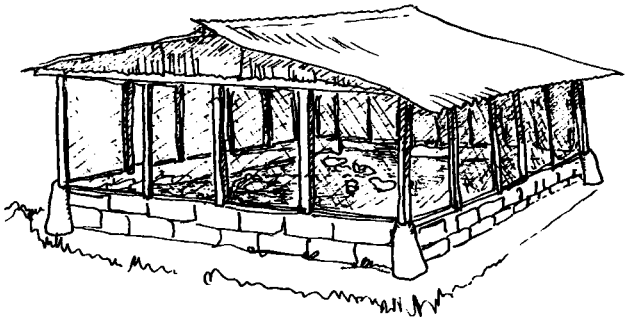


*Figure 10: Confined (indoor) housing system (Source: Meinderts, 1986)*

In a confined system it is difficult to provide access to a pond or water where ducks can swim. Either the ducks will not be able to swim at all, or you have to build a pond and maintain it. It is quite easy to provide a large shallow container with water so that ducks can wash and bathe.

## *How to choose the system that fits best in your conditions?*

Your interests and (financial) possibities will determine which system you choose. It is recommended to start with a semi-confined system in which you can keep an eye on the ducks and don't need to spend too much money right from the start.
In a free-range system you may lose your ducks easily, especially if you are a beginner; while in an intensive system of duck keeping the financial risks may be too big.
Once you become an expert with a semi-confined system and you know the market for ducks and eggs you can decide to expand your business. It is also worth considering combining duck keeping with other types of farming as described below.

## 4.2 Combining duck keeping with rice cultivation

In Southeast Asia, duck keeping is often combined with rice cultivation. A flock of ducks can easily be kept on a rice field. Ducks feed on snails, insects, larvae and weeds in the rice fields, thus keeping pests down. However, ducks will find little food in rice fields where chemical insect killers and weed killers are used. These insecticides and pesticides poison the ducks. Therefore:

> Keeping ducks in rice fields is not recommended when using pesticides on your crop.

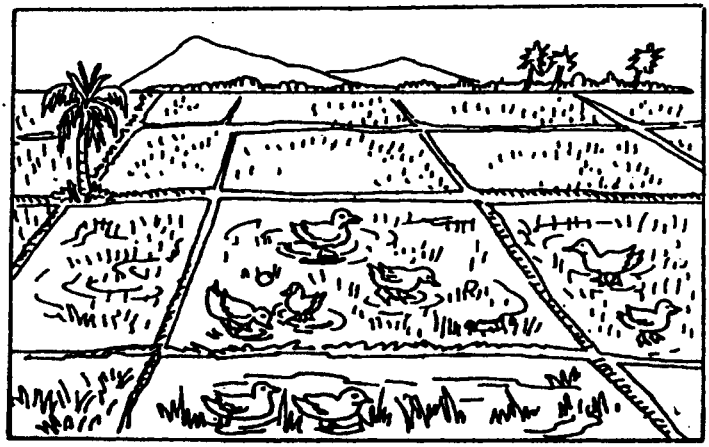


*Figure 11: Duck keeping combined with rice cultivation (Source: Meinderts, 1986)*

## 4.3 Combining ducks with fish culture

Duck keeping combines very well with fish culture. Ducks profit from the pond: ducks raised in water grow more quickly than those raised on land and they are cleaner and healthier. Fish benefit from the ducks: the manure of the ducks fertilizes the pond and increases fish food (algae).

### *Managing the fishpond*

Managing the water quality is most important. Oxygen plays an important role in determining the quality of the water. Fish need oxygen. Waterplants (especially algae) produce oxygen with the help of sunlight. At night they use up oxygen again. Micro-organisms that break down the manure also use oxygen. Duck manure fertilizes the water plants and stimulates the growth of the micro-organisms.
If there is too much manure, the algae grow fast and the water becomes dark green. The many algae will use oxygen at night and so will the many micro-organisms that break down the manure. The result is an oxygen shortage and the fish will die. See also Agrodok 21: 'On-farm-fish culture' for more information.

From the above it is clear that you should keep a close eye on the water quality. An easy practical way of testing is given here:

> *Testing the water quality*
> A simple test to check the water quality is to put your arm into the water until the elbow. If you can still see your hand, there are not enough algae and the pond needs more fertilizer. If you can see about half of your arm then there are enough algae in the water and the water quality is good.
> If you can hardly see your arm at all, then there are too many algae in the water, you should stop adding manure to the water, possibly add fresh water or aerate the water through stirring.

Ducks stir up the bottom of the pond when looking for food. This reduces algae growth as sunlight cannot penetrate so deep into the water. By keeping the ducks in one half of the pond only, algae can grow in the other half, which also provides food for the fish. The banks of the pond have to be fenced off so that the ducks do not destroy them.

## *Housing for ducks*

Ducks only need shelter for resting (Figure 12). Generally speaking a minimum area of 0.5 $m^2$ per duck is required.
Ducks can be housed in a variety of ways. A pen can be built which floats on the water, or resting on stilts above the water or on the bank of the pond. A shelter built above the water must have a floor of slats or mesh, which will let the manure through. (See also Chapter 5, Housing). Ideally all the manure should fall into the water. By fencing off the banks with wire or netting, and not allowing the ducks to roam on the banks you can ensure that all manure is deposited in the water, and that the banks remain undamaged.

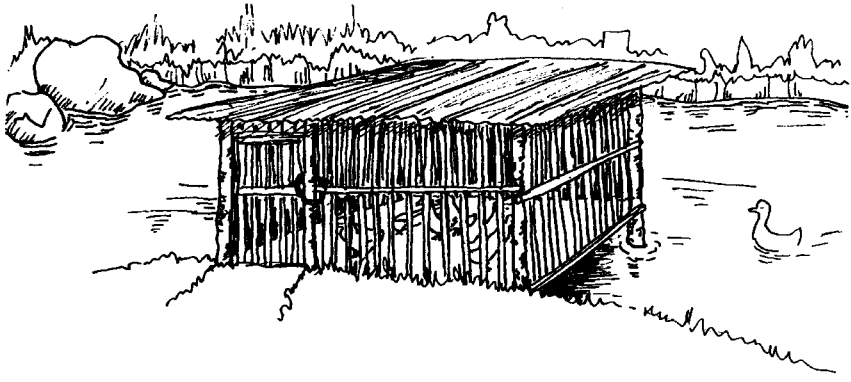


*Figure 12: Ducks above a fishpond*
*(Source: Meinderts, 1986)*

## *Managing the system*

Most fish species take about 6 months to reach market weight. In order to ensure that the manure supply remains constant it is best to keep of different ducks together.
Once the fish has been harvested the pond will be empty of fish, and it is not good to add manure to it. So the ducks should be given a run in another place. After four or five years the pond needs cleaning. The manure remaining in the pond can be taken out and used for crops or added to compost. Another way of using the manure is to grow crops in the dry pond (see Figure 13).

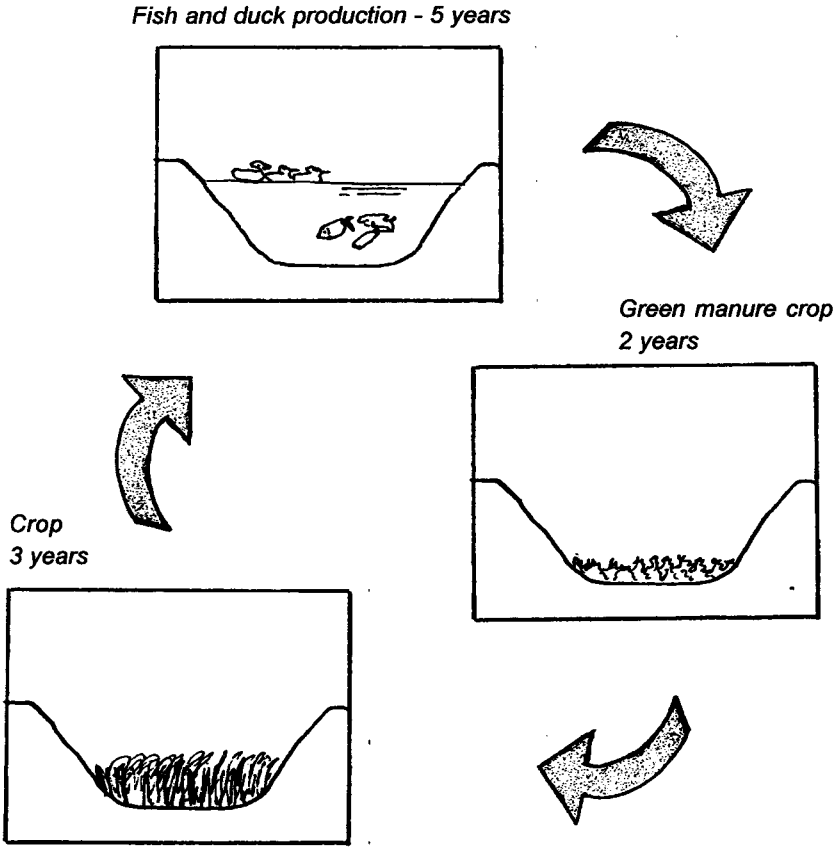



*Figure 13: Growing crops in a fish pond (Source: Jinshu, 1997)*

## *Choice of fish species and numbers of fish and ducks*

The fish for stocking the pond must be at least 10 cm in length otherwise they will be eaten by the ducks. It is difficult to give exact numbers of fish and ducks because the numbers are dependent on many factors. Here we only give a few guidelines. You always have to keep a close eye on the pond and on the quality of the water (see also the beginning of this section). You have to try out and adjust the numbers until you have found a combination that works well in your own situation.

## *Different fish species can be raised together with ducks:*

- *Carps*
  Different sorts of carp can be kept in combination with ducks. The stocking density is 45 to 60 fish per 100 $m^2$. Possible combinations of different sorts of carps, per 100 $m^2$ are:

| | | |
|---|---|---|
| 24 catla carp | 18 catla | 9 catla |
| 18 rohu carp | 18 rohu | 12 rohu |
| 18 mrigal carp | 12 mrigal | 9 mrigal |
| | 12 common carp | 12 common |
| | | 9 silver carp |
| | | 9 grass carp |

  When common carp are raised on their own, the density can be 200 fish per 100 $m^2$.

- *Tilapia*
  The stocking density of tilapias is 100 or 200 fish per 100 $m^2$ .

- *Catfish*
  Catfish are not very sensitive to oxygen content in the water, they can breath in oxygen from the air as well as from the water. Because of this their density can be quite high and they are less sensitive to the amount of manure. A density of 400 fish per 100 $m^2$ is possible.

## *Number of ducks per pond*

Where tilapias are raised (200 fish per 100 $m^2$) a maximum of 35 ducks per 100 $m^2$ can be kept. For carp and catfish a maximum of 70 - 75 ducks per 100 $m^2$ can be reared.
The numbers of ducks and fish in a pond depend on many different factors, you have to try out, watch closely and find the best combination for your situation, see also the section on water quality in the beginning of this Chapter.

## *Yields*

Where fish production is integrated with ducks you can obtain yields of 30 to 55 kg fish per 100 $m^2$ per year. The yield will depend on the number of ducks per square metre and the fish species raised.

# 5 HOUSING

When you choose to keep ducks you have to provide some kind of housing for them. Ducks need a minimum of a night shelter because they lay their eggs during the night and in the early morning (within three hours of sunrise). By keeping ducks inside at night you can ensure that they lay their eggs in a confined space.
Nesting boxes are not necessary, but if you provide them the ducks will use them. An advantage of nesting boxes is that they are easy to keep clean. Eggs laid in clean nesting boxes will be cleaner, and eggs which look clean are easier to sell than dirty ones.

## 5.1 Night shelter

Housing for small-scale duck keeping should not require too much care and maintenance. A night shelter should be sufficient and does not require much space per duck: 1 $m^2$ is enough for five to six ducks. If the ducks are going to make use of the shelter during the day as well, then they need more space. In that case 1 $m^2$ is needed per two ducks.
It does not matter what kind of material you use to make the shelter: Bamboo, wood or chicken wire are all fine as long as the holes are small, so the ducks cannot go through.

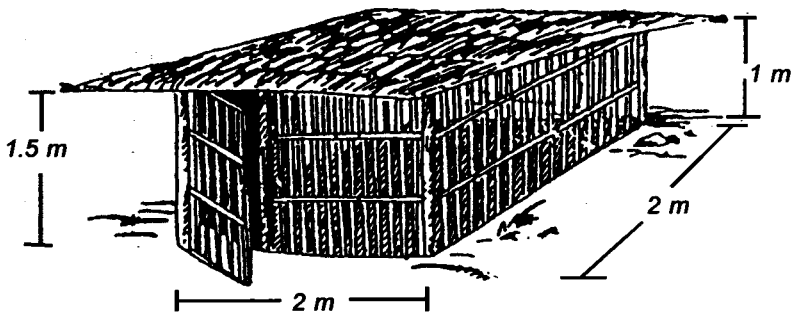



*Figure 14: Night shelter for 20 - 25 ducks (Source: Meinderts, 1986)*

The shelter must be well ventilated when the ducks are inside. Fresh air is important to prevent the ducks developing respiratory problems. Diseases which are spread through the air (airborne diseases) can be prevented by good ventilation.
Air circulation in the shelter makes the temperature lower.
The temperature should not be lower than 10 - 15°C for Peking ducks or 20°C for Muscovy ducks and other ducks from tropical climates.

## 5.2 Separate laying area

It is very simple to make a separate laying area within the night shelter. Ducks prefer to lay their eggs in a dark, protected space. Nesting boxe offer ducks a sheltered place to lay their eggs. The eggs laid in these boxes are easier to collect.
Ducks prefer to lay at ground level so you can place the construction on the floor. It is best to attach the construction to the back wall of the night shelter. In this way the ducks can sit quietly, away from the rest of the flock, when they are laying.

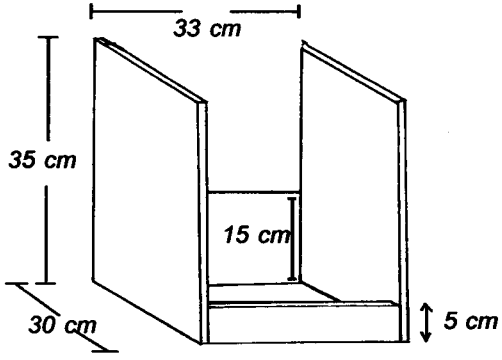



*Figure 15: Nesting box*

When building nesting boxes you need to make one box for every three to six ducks. A simple construction is one with side walls of 30 x 35 cm. Assemble these at a distance of 33 cm from each other. Attach them to each other at the back by means of a raised edge 15 cm high. Attach a raised edge of 5 cm height at the front.
Place straw in the nesting boxes and clean them out regularly.

## 5.3 Floor

The type of floor depends on where you place the night shelter. If you build a night shelter above water, the floor can be made of open slats using wood or bamboo. It is not a good idea to use chicken wire or a metal grate as these do not give the ducks' feet enough support, and can damage their feet. Floor slats should be 2 cm thick and 5 cm wide in order to be strong enough. Leave about 1 cm between the slats. These gaps will ensure that there is sufficient ventilation at night. Another advantage of these gaps is that spilt food and droppings will fall straight into the water, whereas the eggs will stay in the shelter. This makes cleaning the shelter easy and it fertilises the pond below.

If you cannot build the shelter over a pond then the floor does not need to be slatted. You will have to clean out nest material and manure more often to prevent diseases from spreading.

Clean litter is very important in nesting boxes and on a closed floor. Litter prevents dirt and dampness from forming a hard layer on the floor. Straw or rice chaff make good litter. Sawdust can also be used for litter, but you must make sure that there is no paint in the sawdust as this can poison the ducks. Sawdust is not a good idea in a confined system as it gets caked onto the floor and is very difficult to clean off.
The litter must be kept clean by replacing it regularly, especially in the nesting boxes. Litter which is damp and mouldy not only causes sickness in the ducks, but damages the eggs so that they rot or do not hatch. Ducks are very sensitive to mould in litter.

## 5.4 Feeding troughs

Ducks kept in a free-range or semi-confined system do not need much equipment for feeding. Scattering the correct amount of feed on the ground each evening is sufficient. If you decide to feed the ducks when they are in the night shelter then you need to use containers for the feed. This way the food stays clean and the ducks do not trample on it. Ducks are very messy eaters. If you put food in containers you must make sure you can clean the area around them easily.

## AGRODOK - QUESTIONNAIRE

*Dear Reader,*

*This is a questionnaire addressed to all readers of Agrodok publications. As publishers we would very much appreciate receiving your views and opinions on the contents of this particular Agrodok. We would like to learn from your experience, in order to improve future editions. We would also like a little information on your background, so that we can get to know our readers better and adjust the contents of the Agrodok series to meet your needs. We would therefore kindly ask you to detach this page carefully from the book, fill in the questionnaire, and return it to:*

**Agromisa, P.O. Box 41, 6700 AA Wageningen, The Netherlands**

*Please tick or complete the relevant option(s). Do not hesitate to provide more details on a separate piece of paper if need be.*

1 ***Title of this Agrodok:*** .....

***Year of last edition (see first page):*** .....

2 ***Are you*** : O Female; O Male

***Country & region*** : .....

3 ***What is your profession or occupation? (you can tick more than one option)***

O Extension worker
O Teacher or trainer
O Student
O Farmer
O Project manager or managerial staff
O Documentalist / librarian
O Researcher
O Other, please specify: .....

4 ***What is the highest level of education you have reached?***

O Vocational training directly after primary school
O Secondary school
O Vocational training directly after secondary school
O University
O Other: .....

**5 *How did you come to know about this Agrodok?***

O Through SPORE
O Through Agromisa's Newsletter (or Nieuwsbrief)
O Through an article in another magazine. If so, which? .....
O By word of mouth
O Through the organisation I work for, or school where I study
O Through another Agrodok which I had seen before
O Other. Please specify: .....

**6 *For whose benefit did you obtain this Agrodok?***

O For my own personal benefit
O For the benefit of my organisation
O For somebody else's benefit. Please specify: .....

**7 *How did you or your organisation obtain this Agrodok?***

O I requested it from CTA, through the Publications Distribution System.
O I ordered/bought it from Agromisa, and paid for it.
O Other. Please specify: .....

**8 *What information were you looking for in this Agrodok?***
*(you can tick more than one option)*

O Information for use in teaching or training
O Information for the preparation of extension material
O Information about new practices or new methods
O Solutions to a problem encountered with current methods or practices
O Other type of information. Please specify : .....
O No specific information, I read the Agrodok out of general interest

**9 *Did this Agrodok cover the subject to your expectations?***

O Yes, fully
O Yes, partly
O No, the content was rather disappointing
O No, the content was very disappointing;
*If "no", please explain briefly on which aspects you need more information or which aspects were treated unsatisfactorily:*

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***10 Did you find the language used clear and easy to understand?***

O Yes
O No

*If "no", please explain briefly:*

---

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***11 Did you find the illustrations clear and easy to understand?***

O Yes
O No

*If "no", please specify which illustrations are not clear, and why:*

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***12 Did you do anything concrete with the information in this Agrodok?***

O Yes, successfully (continue at 15)
O Yes, but I encountered problems (continue at 14)
O Not yet, but I still want to try
O No, (continue at 13)

***13 You did <u>not</u> do anything concrete with the information. Why?***

O The practices proposed are too expensive.
O The practices or solutions proposed are too laborious.
O The materials proposed are not available.
O The practices proposed are not suitable for the local soil and climatic conditions.
O The practices proposed do not fit in with local customs.
O Other: .....

*Now continue at question 16*

***14 You had problems in applying methods or techniques described in this Agrodok. Please explain which and why, briefly:***

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*Now continue at question 16*

***15 You applied the information successfully.***

***a) What were the tangible results from putting the information into practice?***

*In your answer please explain what results you achieved with respect to improvements in technique, to the quality of your produce, to savings in time or materials, cost reductions, income generation, etc.*

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***b) For whose direct benefit did you use the information in this Agrodok:***

O For my own benefit
O For my colleagues
O For my students
O For farmers
O Others, please specify:

***16 If you have any comments or suggestions for improving this Agrodok, please state them below:***

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***17 If you have suggestions for topics which could be covered in future Agrodok publications, please give them below:***

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***Thank you for taking the time to fill in this questionnaire !***

A large bowl with a flat bottom or a hollowed out tree trunk as shown in figure 16A can be used for feed.

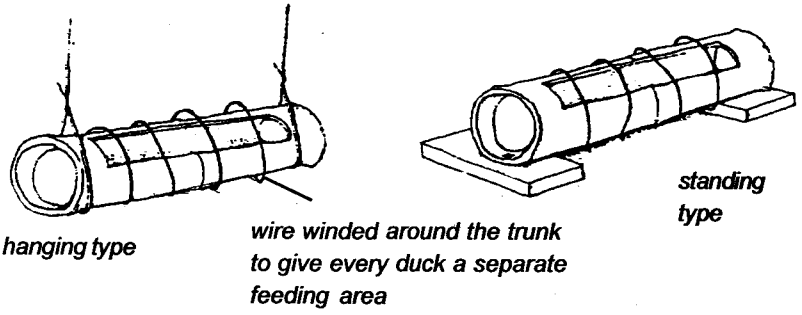



*Figure 16A: Feeding troughs*

To prevent spillage you can use a feeding trough like the one in figure 16B. The anti-waste lip prevents a large amount of the food being spilled.

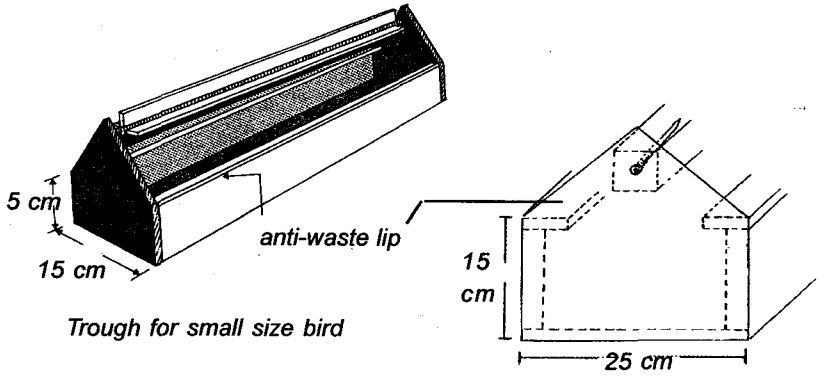



*Figure 16B: Troughs with anti waste lip (Source: MAFF UK, 1980)*

*Sizes of trough for larger bird*

You can adjust the sizes of the trays to the size of the bird.
Sometimes wild birds will eat out of the feeding troughs. To prevent this food waste, place a low roof over the feeding trays. Wild birds will not usually go under such a low roof.

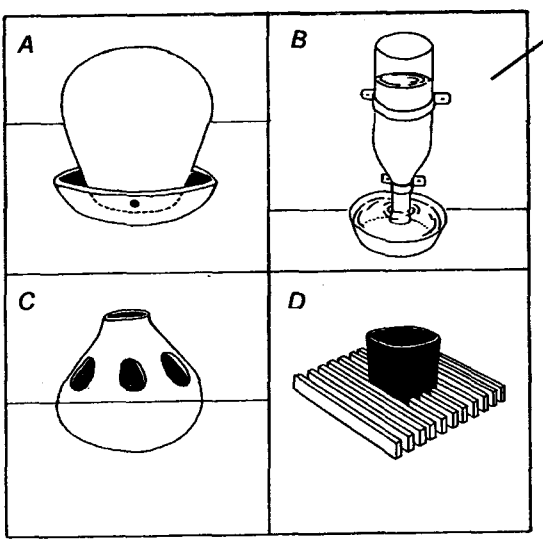
## 5.5 Drinking water systems

Ducks need water day and night. By making a pond, or putting down a bowl of water you solve the problem of access to water during the day. It is very important that ducks always have access to clean drinking water. Young ducks which do not get enough water will not grow well and will become sick. Adult ducks which do not have enough water will lay fewer eggs. A serious water shortage will kill ducks (and ducklings) quickly.

As with the feed trays, put water in shallow bowls that do not tip over easily if a duck stands on the edge.

*A: Earthen pot upside-down with a little hole just under the edge.*

*B: Bottle, opening of bottle should be under the water level. Fill the bottle completely before putting it upside-down.*




*C: Gourd, with holes through which the ducks can drink.*

*D: bowl, secured in wooden tray so it can not be pushed over.*

*Figure 17: Drinking systems (Source: Williamson, 1978; French, 1981)*

Check the water bowls once or twice every day to make sure that there is enough water and that it is clean. Figure 17 shows types of water container which prevent the water from becoming dirty quickly. It is important that the ducks cannot immerse themselves in their drinking water, as that makes it dirty very quickly. However, the water must be deep enough for the ducks to be able to put their heads under water. They need to do this to clean their eyes. If they cannot do this dirt becomes caked around their eyes, and in extreme cases this can lead to blindness. Ducks also use their drinking water to clean food remains off their beaks.

## 5.6 The importance of water

Ducks are water birds and need water to be able to breed and grow well. Give ducks access to water in the form of a pond or a puddle of clean water, or even just a large container with water in it. If it is not possible to keep ducks near water the whole day it is sufficient to place a tub of water out for them in the mornings and evenings so that they can keep themselves clean and therefore more healthy.

Different sorts of ducks differ in their water requirements. Peking ducks need water to keep their body temperature at the right level. This is not so necessary for Muscovy ducks as these are originally tree-dwellers. Some types of duck also need access to water to mate.

Remember that water can be a source of disease and vermin. Pools, ponds, troughs or tubs of water all need to be kept clean and hygienic.

## 5.7 Daily care of ducks

When the housing is arranged well, including feeding troughs, drinking water equipment and access to bathing water, you can then acquire ducks. In the chapters before, choice of breeds, breeding and raising and caring for ducklings have been treated. Also different systems have been discussed and you must have chosen one.
Following on from this chapter you find information on health care, feeding and the products. But first, you have to take daily care of your flock of ducks.

The overview below provides a short summary of daily care in order to give you an idea of things needed to be done.

## *Daily care of ducks*

*Morning*

- let the ducks out of the shelter
- collect the eggs
- give fresh drinking water
- If there is no pool of water, put out fresh bathing water.
- clean the shelter and repair if necessary
- sell the eggs if you wish

*Evening*

- scatter fresh straw or rice chaff if litter is wet
- give ducks fresh drinking water
- feed ducks
- shut ducks up for the night

Anytime: Watch your ducks to see how they feed in order to notice any other problems. See also Chapter 7.

# 6 HEALTH CARE

## 6.1 Preventive health care

Health care for ducks does not require much time. In contrast to chickens, ducks are less likely to become sick and are susceptible to fewer diseases than chickens.
In order to know whether a duck is sick you first have to know how a healthy duck looks. Table 2 lists the most important characteristics of healthy and unhealthy ducks.

*Table 2: Main signs of health and illness in ducks*

| Characteristics | Healthy ducks | Unhealthy ducks |
|---|---|---|
| General condition, first impression | Lively | Listless, unusually quiet |
| Weight | Good | Often light |
| Growth rate | Normal | Too slow |
| Eyes | Lively, bright | Listless, dull |
| Cloaca (genital / anal area) | Large, soft, moist, pink | Shrivelled, dry, discoloured |
| Skin | soft, loose | Wrinkled, dry |

The most important information in this table tells you how to recognise a healthy duck: how it should be growing, how the eyes and cloaca (genital/anal area) look and how the skin feels. A good way of becoming familiar with how a healthy duck looks is to regularly study ducks for a short while. This does not mean you have to pick each duck up every day and examine it closely, but just spend about 10 minutes observing the flock wandering around, noting how the ducks look and whether they are eating well.

## 6.2 Preventive health care

Good hygiene and vaccinating ducks are the two most important aspects of preventing ducks becoming ill.

### *Good hygiene*

The most important factor in good health care for ducks is the same as for chickens: good hygiene. By keeping the shelter and its surroundings clean you reduce the chance of disease breaking out. Good hygiene practices also keep vermin like rats, but also flies and lice, away.

It is more difficult to keep an eye on free-range ducks: what they come into contact with and exactly what they eat. Ducks can also become sick from contact with buckets or crates which may contain traces of diseases. It is important to know that dirty drinking water and food can be a cause of sickness.

Important measures in good hygiene:

- Keep the shelter and outside run as clean as possible.

- When a whole flock is removed (all-in-all-out system) after a laying cycle or fattening cycle, take the time to clean the shelter really well and disinfect it. Remove all the old litter and use it for compost. Clearing litter regularly reduces the chance of disease and sickness in the shelter and infecting the ducks.

- Keep an extra sharp eye on sick ducks. If possible keep sick ducks separate from the healthy ducks. This prevents the disease from spreading to other ducks or even chickens.

- As soon as many ducks become sick, or the disease symptoms become much worse, or ducks start to die you must take measures to prevent the healthy ducks becoming sick. Dead ducks must be removed as quickly as possible, not only because they are infectious, but also because they will start to rot and attract flies. Flies transmit the diseases and often bring other diseases as well.

### *Vaccinations*

Some diseases are so infectious or so common that it is worth vaccinating the ducks to protect them. If duck keeping is very common in the area where you live it is especially worthwhile vaccinating your own ducks. It is best to obtain information on the subject from a local veterinarian.

## 6.3 Diseases

If your ducks become sick despite preventive measures, there are a number of things you can do. Many diseases can be treated with medicine, which you can get from a veterinarian. If you know local medicines, which are used to treat chickens, you can also try them on ducks. A common preventive measure taken in India is to mix garlic into the duck feed. You need one clove of garlic per duck per day. Turmeric also works well. Both of these spices can affect the flavour of the meat and eggs, so do not use too large quantities.

Below we describe the most common duck diseases. These are intended to give you an indication of the main symptoms, so that you can try to work out what is wrong with your ducks. If there are serious problems, or if certain problems keeps coming back then it is a good idea to ask advice from a veterinarian.

### *Botulism*

➤ Symptoms

If there is botulism in the flock a number of ducks will become paralysed very quickly, and then die. In the first stage the neck, head and legs become quickly paralysed. An easy sign to recognise is that a sick duck will lay its head down on the ground because it can no longer lift it up. Once general paralysis has set in death follows in a few hours.

➤ Cause and treatment

Botulism is caused by *ducks eating* food which is *rotting. Botulism* is caused by bacteria which are present in rotting plant remains, animal remains and also in stagnant water. During long periods of warm weather the risk of botulism rises as the bacteria can reproduce themselves more

easily. Botulism is best prevented by not letting ducks come into contact with rotting food and animal carcasses.

Once you decide a duck has botulism you can give it something which will make it vomit the rotten food out of its stomach (an emetic), you must take extreme care care in doing so, protect yourself by wearing gloves. WARNING: botulism also affects people. Those looking after ducks which have botulism should take care not to contract the disease themselves!

Unfortunately ducks become sick and die very quickly with botulism, which means that this treatment often comes too late.

Dead ducks must be removed as quickly as possible and the shelter must be cleaned. You can disinfect the shelter by adding some Dettol to the cleaning water. Also here you must wear protective clothing and gloves!

## *Fowl cholera (pasteurellosis)*

➢ Symptoms

Ducks of all ages are susceptible to *fowl* cholera. Sick ducks first become listless and lacking in energy. They eat less, but drink more than healthy ducks. They shake their heads a lot and their droppings are watery and yellow/green in colour (diarrhoea). The eyes are damp and the nostrils contain slime.

➢ Cause and treatment

*Fowl* Cholera is passed between ducks through the slime in the nostrils which is deposited on food. Healthy animals pick up the disease from the food and become sick. You can vaccinate ducks each year against cholera. This is a way of preventing cholera.

If the ducks contract cholera despite of the vaccination then there are medicines which can be used to treat it. If your ducks have cholera you must warn the veterinarian. The disease spreads very quickly and has a high death rate (5 - 35%). Medicine is not always available, and then other measures must be taken. The sick ducks must be slaughtered and

destroyed. *(Burned or buried)*
The shelters and any outside runs must be disinfected well, and you can disinfect with a little Dettol in the cleaning water. If the shelter is not properly disinfected there is a chance that the disease will stay in the shelter and affect the healthy ducks.

It is also possible to alleviate the symptoms of *fowl* cholera. In India this is done in the following way:

➤ For 10 ducks mix 7 - 10 chopped cloves of garlic with the feed. Use for 2 - 3 days until the diarrhoea stops.

➤ Grind 10 g fresh ginger and squeeze out the juice. Mix this with 250 ml water and 10 g brown sugar. This provides enough drinking water for 10 ducks.

➤ For 10 ducks cut up 5 chilli peppers (*Capsicum annum*) into small pieces and mix them into the feed.

## *X-disease (aflatoxicosis/mycotoxicosis/cirrhosis of the liver)*

➤ Symptoms

Symptoms are seen especially in young ducklings. Infected ducklings grow slowly and feathers are badly formed. They may also have oedema (swelling due to water retention). The feet and soles of the feet may start to wither away. The liver becomes fatty and hard. It is easy to see the whitish yellow fat when a dead duck is cut open. Many ducklings die of this disease, whereas adults may show no symptoms at all.

➤ Cause and treatment

The disease is caused by aflatoxin, a poisonous substance sometimes found on groundnuts (peanuts) and products made from groundnuts. There is no medicine available to treat this disease. The only way to prevent ducklings from getting the disease is to make sure they do not eat groundnuts or groundnut products. Check what the ducklings eat if you grow groundnuts yourself.

## *Viral hepatitis of ducks*

➤ Symptoms

Viral hepatitis is a disease, which only affects ducklings. It is a highly contagious disease, which spreads quickly. Infected ducklings deteriorate quickly and die.

Ducklings with viral hepatitis walk unsteadily, and the beak and leg skin turn blue. A few hours after the appearance of the first symptoms the ducklings fall on their side and get muscle spasms. In the final stages the legs are stretched out behind and the head lies on the back. The death rate may be as high as 80 - 95%. Internally, the liver swells up and little internal bleeding can be seen. The kidneys may also be swollen.

Viral hepatitis can also be recognised by sudden death of three week-old ducklings.

➤ Cause and treatment

A virus causes the disease. Ensuring good hygiene can prevent the disease, and there is also a vaccine available. The ducklings can be vaccinated, but the mother ducks can also be vaccinated. Mothers which have been vaccinated transfer their immunity through antibodies to the egg yolk. These antibodies protect the ducklings for three weeks after they hatch. Once the inherited immunity has worn off they are also no longer susceptible to the disease, as it does not affect ducklings older than three weeks. If you want to vaccinate mother ducks or ducklings you should contact a veterinarian.

## *Coccidiosis*

➤ Symptoms

Coccidiosis is a disease which is hardly found at all in some areas, while in other areas it causes the death of 20 - 70% of ducklings 3 - 7 weeks old. In addition to the high death rate, the ducklings that survive grow more slowly and have a lower adult weight than the ducklings that were not sick.

There are usually few or no visible symptoms of coccidiosis. Symptoms may include dehydration, weight loss and inability to stand up. The only way to be sure of the disease is to cut open a dead duckling and examine the inside. In the middle part of the intestine there will be a slime layer with blood spots. With a microscope it is possible to see banana-shaped organisms in the stomach contents.

➤ Treatment

Once the ducklings are sick it is difficult to treat and cure them. There are medicines which prevent coccidiosis. These can be mixed with the feed. Ask the veterinarian for advice.

# 7 FEEDING

## 7.1 Ways to feed ducks in the different systems

### *Free range systems*

Ducks are easier to feed than chickens. Ducks can graze and digest local food more easily. Ducks like snails, shells and water weeds, which they can often find in fields, rice fields, small ditches and other water sources. Ducks need additional feed if they are to lay eggs or be used for meat. Free-range ducks will get enough protein from grass, small fish, shellfish and insects. In addition they need energy. You can supplement the ducks' food with energy-rich foods such as rice, cassava (by-products), sago, sweet potato, etc. You can use this extra food to encourage the ducks to come inside in the evening.

### *Confined systems*

Ducks kept inside (confined) cannot look for their own food, and are therefore dependent on what you feed them. The best is feed specially made for ducks. These are complete feeds and you do not need to add anything to them. If you want to feed the ducks more cheaply you can replace one third of the special feed with vegetables (leftovers), household waste and other feeds such as sweet-potato tops, water plants such as kangkong (*Ipomea aquatica*) and duck weed. You can also make feed yourself for the ducks, which is explained in Section 7.5.

## 7.2 Drinking water

Ducks need water in order to be able to absorb nutrients from food into the bloodstream and also to eliminate toxic substances from the body. Water is also needed to maintain a constant body temperature, it is particularly important when the weather is warm. Ducks pant in order to lose heat and therefore cool themselves down when it is hot. Lack of water in warm weather will result in dead ducks. Other factors, which also influence the amount of water ducks require, include the type of feed they get, laying frequency and the size of the duck.

An adult duck needs at least 2 litres of water each day. Table 4 gives a guideline for the amount of water needed by young ducks.

## 7.3 Quantities of food

Generally speaking ducks eat as much as they need. If you notice that your ducks are losing weight, it means they are getting too little food or that they are sick. If they are getting too little food, then you need to give them more feed and they will put on weight once they have started to eat more. If you give them more feed but they do not eat more, it may be because the feed is of bad quality. If this is the case then the ducks will start to eat more once you improve the quality of their feed.
If you give the ducks so much to eat every day that there is always some left over then they are getting more than enough. In this case you could give them less, as food which is not eaten will start to rot quickly. If the ducks eat food which has gone bad, it may make them sick.

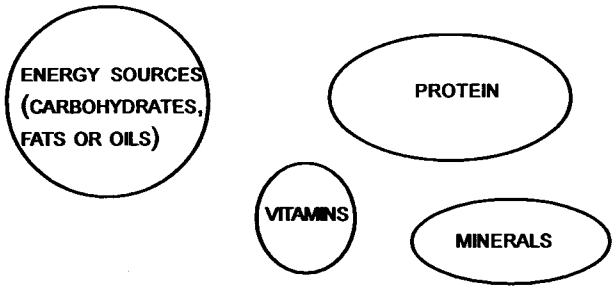
Ducks which continue to eat pootly even after you have taken the above measures are probably sick. You can find more information on duck diseases in Chapter 6, but it is also a good idea to contact a veterinarian.

When deciding how much to give the ducks to eat, it is also important to know how much they can eat. The amount of food that a duck requires depends on the duck's age and on the use to which the duck is put (for eggs or meat). Obviously an adult duck will eat more than a week-old duckling and a duck that needs to produce eggs or meat needs more then a drake that's kept only for breeding. For more details see Section 7.5.

Ducks which get too much to eat become fat. When you slaughter a duck it should have a fatty layer which is not thicker than 0.5 cm.

## 7.4 Nutrients in feed

Duck feed must include the following essential nutrients:




First we consider these essential nutrients. In Section 7.5 attention will be paid to feeding methods and feed composition.

### *Energy*

A duck needs energy for body maintenance, movement, growth and for the production of eggs and meat. The energy in the diet is derived largely from carbohydrates, some is also derived from fat or oils.

ENERGY

Foods which are good sources of energy, include:

cassava, sago, sweet potato, yam, taro, maize, corn, rice grains, rice bran, leftover rice from cooking, molasses and fruit.

The amount of energy contained in foodstuffs is normally expressed in kilo-calories (kcal) per gram of food. Kilo-Joules are also used:
4.2 kJ = 1 kcal.
An adult duck of 1.7 kg needs at least 400 kcal per day. This is only enough for looking for food, breathing and digesting food. It is called the maintenance requirement. A duck, which is growing (duckling) or is laying eggs (layer) needs extra energy. A layer weighing 1.7 kg needs at least 440 - 490 kcal per day. A layer which also has to look for its own food all day will need more energy than a duck that sits inside all day. Heavier layers and ducks, which lay an egg almost every day, need between 500 and 600 kcal per day.

## *Protein*

Proteins are important for body maintenance, growth, production of eggs and meat and for the vital bodyfunctions. Young ducks need protein in order to grow, especially in the first few weeks. If a young duck does not get enough protein it will grow slowly or not at all.

PROTEIN

Foods which are good sources of protein include:
young grass, vegetables, water weed, small fish, shellfish, snails, crabs, shrimps, insects, blood-meal, fish meal, skim milk powder, cottonseed cake meal, lucerne meal, soya bean, sunflower cake meal.

## *Vitamins*

Vitamins are needed (in small quantities), for various body functions. Free-range ducks will get the most important vitamins they require from the green food they eat such as young grass or vegetable remains. Ducks, which are kept inside (confined) are dependent on the vitamins in the feed they are given. In this case it is worth buying a vitamin and mineral premix. It is generally true to say that ducks which are given a varied diet including different sorts of feed will not run the risk of a vitamin deficiency.

VITAMINS

Niacin, for example, is an important vitamin for growth and feathering. Laying ducks, which do not get sufficient niacin, may develop leg weakness.
Niacin is found naturally in whole grains, but young ducks cannot digest these fully. Therefore it is advisable to supplement the feed for ducklings and layers with 5 - 7% leftovers from brewing (dregs from fermented millet, banana, coconut, wheat or maize). This is good for growth and preventing leg weakness. You can collect brewing dregs from places where drink is brewed. Dregs must be collected regularly as they decompose and rot very quickly, but do not smell bad so you do not always notice this happening. Collect fresh dregs every other day and keep them in a clean container.

### *Minerals*

In addition to vitamins, ducks also require small amounts of minerals. Minerals are important for vital body functions. The most important minerals are calcium (Ca) and phosphorus (P). These are needed for bone formation and maintenance and for making eggshells.
Ducklings need a Ca:P ration of between 1:1 and 2:1.
Ducks which are laying require a Ca:P ratio of 6:1 and need 4.0 g of calcium every day in order to be able to make the eggshells.

MINERALS

Foods which are a good source of calcium include:

oyster-shell grit, limestone flour, steamed bone flour and bone-meal, ground eggshells and shells.

Foods which are a good source of phosphorus include: steamed bone flour and bone-meal. Scatter powder or meal over the duck feed.
It is not advisable to make steamed bone powder yourself. Steam does not disinfect the bones sufficiently, and the powder may make the ducks sick.

## 7.5 Feed composition and requirements

The composition and the quantity of food will determine whether the ducks' requirements are fulfilled. The age of the duck and the use it is put to determine its requirements.

### *Ducklings up to 8 weeks*

Day-old ducklings can be given a mixture of coarsely milled cereals, moistened with milk or water as their first feed. After a few days they will be ready for a mixed feed, such as the following composition:

| | |
|---|---|
| milled cereal | 30 % |
| fine cereal bran | 30 % |
| ground soy bean | 25 % |
| oil-cake meal extract | 10 % |
| fine grit and minerals | 5 % |

Add enough water to make a crumbly mixture. If you add too much water the mixture will stick to the beaks of the ducks. Only add the water just before you give the ducks the feed. Otherwise the feed will go sour and turn bad.

It is a good idea to add a vitamin-mineral premix to the feed to make sure that the ducklings get enough vitamins and minerals.

Table 3 shows how often ducklings should be fed, the number of feeds per day decreases when the ducks grow older.

*Table 3: Feeding ducklings*

| Time after hatching | Feeding: |
|---|---|
| week 1 + 2 | At least 4 times a day |
| week 3 + 4 | 3 times a day |
| 1 month | *Free range*: they can go out to look for insects, shells, grains and weeds. They do not need much extra feed, except in the evening to encourage them to go inside.<br><br>*Confined:* Ducklings to be fed 2 times a day<br><br>*For both systems*: Make sure that the ducklings have feed and water available throughout the day. |

Table 4 - on the next page - gives an indication of the amount of food and water growing Peking ducks need.

Remember that different types of duck will have different food and water requirements. Table 4 shows that the requirements of growing ducks change rapidly. In general ducks will eat as much as they need. Check if the food is eaten very quickly, if the ducks grow well or if there is food left. Adjust the amount you are giving. See also Section 7.3.

*Table 4: Feed and water requirements of growing Peking ducks*

| Age of duckling (weeks) | Food consumption | Water consumption | |
|---|---|---|---|
| | kg/week/duck | litre/day/duck | litre/week/duck |
| 1 | 0.23 | 0.22 | 1.54 |
| 2 | 0.75 | 0.60 | 4.20 |
| 3 | 1.16 | 0.66 | 4.62 |
| 4 | 1.34 | 0.68 | 4.76 |
| 5 | 1.47 | 0.85 | 5.95 |
| 6 | 1.63 | 1.20 | 8.40 |
| 7 | 1.77 | 1.50 | 10.50 |

Feeds which are rich in proteins are often very expensive. If feed in the form of pellets is available for young chickens then this is also suitable for young ducks.

BEWARE: Chicken feed often contains medicines (antibiotics) which have been specially added. Do not give these feeds to ducks, as the antibiotics are not meant for ducks and will make them sick. It is best to try out a new feed by giving a very little at first to see if it is suitable for the ducks. Duck feed might also contain medicines but these are of course suitable for ducks.

## *Laying ducks: maintenance requirements*

A maintenance diet is recommended for young ducks between 8 and 20 weeks old, and for adult ducks between laying cycles. Young ducks needs more protein and calcium than adult ducks. Where there is enough grass available for the ducks, the adults will not need more than a grain supplement with added vitamins and minerals.

Where not enough grass is available, a more balanced feed is required so that the ducks can build up their reserves for the next laying cycle. You can judge the amount of feed the ducks need according to their condition. If they are too fat, give them less food. If they are too thin, give them more feed.

## *Laying ducks: requirements during a laying cycle*

Free-range ducks will be able to find a large amount of their food requirements outside. You can supplement the diet of free ducks with food leftovers, which contain energy. In addition, laying ducks require extra calcium. You can provide this by giving each duck 80 - 120 g of pellet feed. This will ensure that the ducks get all the nutrients they require.

Ducks, which are kept in a confined system, can best be given laying food from about four weeks before they start laying. If you only feed them with grain they will not get enough protein, calcium and vitamins. The best feed for this period is a mixed food, which can be home made or bought. Recipes are given below.
If you buy a specially mixed duck feed, you do not need to add anything else. The manufacturer of the duck feed has made sure that the feed contains everything that ducks need.

The quantity eaten will depend on the type of duck, its weight, egg production and the availability of grass. Laying ducks usually require between 170 and 230 *grams* per day. Good layers sometimes require as much as 280 g of feed per day. If you notice that the ducks are getting too heavy (i.e. too fat) it is a good idea to close the feeding troughs at night. Ducks which are too fat lay fewer eggs, which is a waste of feed and money.

Here is an example of a simple mixed feed for 20 laying ducks for 7 days:

| | |
|---|---|
| 20 kg broken rice | (50%) |
| 10 kg rice bran | (25%) |
| 10 kg fish meal/fish waste/bone meal | (25%) |
| 40 kg in total | (100%) |

You can mix the above with water to make the mixture moist. Only add water at the time of feeding, otherwise the mixture will rot. This example gives ample feed for confined ducks. It is based on 285 g of feed per duck per day. If you give your ducks 200 g of feed each day, this amount will last for 10 days. How much you give depends on the size of the ducks.

In areas where there is abundant fresh fish, fish meal or shrimp meal you could make up the following mixture:

| | |
|---|---|
| 24 kg rice bran | (60%) |
| 8 kg maize meal | (20%) |
| 8 kg fish or shrimp meal (or the equivalent in fresh fish waste) | (20%) |
| 40 kg in total | (100 %) |

Add 2% cod-liver oil and 2% oyster-shell to this mixture and supplement the feed with some form of green feed (vegetable waste) if the ducks are kept inside all the time.

The following mixture is good for ducks that lay eggs with weak shells. The quantities are for 20 ducks for 7 days:

30 kg grain or by-products
4 kg fish or fish waste
4 kg pulp or fruit waste
2 kg ground shells
200 g salt + 100 g minerals

## *Fattening diet*

Depending on the type, ducks can be slaughtered when they have reached a weight between 2.8 and 3.2 kg. Check the ducks each week to see if they are gaining weight. When they are not gaining any more weight, or only a very little, it is time to slaughter them. If you keep feeding ducks which are not putting on any more weight, you are wasting your money. The composition of the feed will depend mainly on how much you want to spend on the feed, and whether you think you will earn the costs back.

*Summary of important aspects of duck feeding*

- Make sure there is always abundant clean drinking water available.
- Make sure the ducks get a varied diet. This will supply all essential nutrients.
- It is good to let ducks out during the day to graze and shut them up again at night (for protection).
- Always watch what the ducks do with the feed that you give them. If they leave a lot untouched then give them less the next time.
- Clear up feed which is left uneaten so that it does not rot and start to smell. If you leave the feed, it will attract rats and mice and other vermin into the shelter. The ducks can also become sick from rotting food.
- If ducks stop laying eggs, it may be for one of two reasons: 1) they may be losing feathers (moulting) or 2) they do not get enough food, or they get bad quality food, such as mouldy feed.
- If the eggshells are weak, add calcium to the feed in the form of oyster-shell or eggshell grit.

Sometimes ducks die suddenly. This may be due to one of the following:

1. Too little water. 2. Dirty water. 3. Food poisoning. 4. Sickness. Whenever ducks die suddenly contact a veterinarian.

Always watch your ducks carefully, taking note of their condition, health and behaviour. Do this every day. The experience you gain will help you to manage your ducks well.

## 7.6 Food poisoning

Ducks are very sensitive to poisonous substances in their feed. All feeds may contain toxic substances. These usually occur as a result of bad storage of the food stuff, in damp or warm places. Groundnut and maize may contain toxic substances if rotten or infested with fungi.

Ducks may also be poisoned by poisonous plants or decomposing animal carcasses. This is called botulism. Make sure that all the water places that ducks have access to be free of decomposing material. See Section 6.3 for further information on this subject.

Weedkillers and insecticides may also poison ducks. If ducks eat insects or plants, which have been treated, then they will eat the poison. Many of these poisons are not eliminated from the duck, but accumulate in its body. If too much accumulates then the duck will become sick or even die.

# 8 PRODUCTS

Most farmers keep ducks because they want the products from them. Ducks are usually kept either for their eggs or for their meat. Some farmers also keep ducks for their manure.
In this chapter guidelines for production levels are given, and advice on care for the products in order to improve quality. Quality means fresh, clean and good tasting, but also good looking. High quality products will sell better. Therefore the effort of caring for the products is worth it.

## 8.1 Production figures and daily care

Production figures are calculated through monitoring the production levels of a duck type for some time. Because conditions are different on every farm, these figures can only give an indication of what production levels are likely to be. Without experience it is very difficult to estimate what level of production you can expect. After you have kept ducks for a few years you will be able to make your own production estimates. Table 5 gives guidelines for a number of production figures.
Free-range ducks will usually be less productive than ducks kept in confined systems.

*Table 5: Production figures for Peking ducks*

| | |
|---|---|
| Eggs per duck per year | 120 - 130 |
| Average egg weight | 50 - 70 g |
| Incubation period | 25 - 26 days |
| Start of egg-laying period | 4.5 - 5 months |
| Duration of egg-laying period | 12 - 18 months |
| Adult weight, female duck | 2.2 - 3.5 kg |
| Adult weight, male duck | 3.4 - 4.6 kg |
| Ratio male:female | 1:4 |

## 8.2 Care of eggs

Care of the eggs begins the moment they are laid. Ducks usually lay their eggs early in the morning. This means that you only need to collect eggs once a day, in the morning. This in contrast with chickens who lay eggs at all times of the day.
It is best to collect the eggs as soon as possible after they are laid. This makes it easier to clean them, and you can cool them quickly if you need to keep them. Dirt left on eggs can cause disease to penetrate the shell and be absorbed by the egg. This causes the eggs to rot or become infertile.

### *Two methods to clean eggs:*

➢ *Dry method*
Clean as much dirt off the egg with a dry cloth, brush or knife. This is a good way to remove the worst and visible dirt.

➢ *Wet method*
This method is only suitable when you are selling (or eating) the eggs: Dip the eggs in warm water for no longer than 20 seconds. The water should be a little warmer than the eggs so that you can clean them well.

If you want the eggs to hatch, it is better not to wash them in water. Eggshells have small holes (pores) which open up when the egg is put in water. Diseases can enter the egg through these holes, which may mean the egg will not hatch.

### *Storing eggs*

You can collect and store eggs in order to sell every other day or once a week. You can also collect and store eggs so that you can incubate many at the same time. Always keep eggs which you are going to sell in a cool place, if possible (also if you sell the same day). Once you have cleaned the eggs you need to cool them as quickly as possible. Eggs which are going to be eaten must be kept at a low temperature: 4 - 7 °C. The shorter the period the eggs are kept the less important the storage temperature is.

Eggs which are going to be incubated, must be kept at a storage temperature between 13 - 16 °C. If the eggs are stored at a warmer temperature (16 - 38 °C) the duckling will start to develop, but the process goes so slowly that the duckling will die in the egg.
Eggs for incubation can be stored for a maximum of seven days. After seven days the number of stored eggs that will hatch decreases rapidly. See chapter 3 for more information on incubation and hatching.

## *Management of layers and egg production*

As indicated in Table 5, ducks can start to lay eggs from about an age of 5 months. Ducks which are well cared for will often continue to lay eggs for about one and a half years. The number of eggs that a duck lays also depends on good management: how much time and care you spend on your ducks. This includes all aspects of duck keeping: housing, feed and health. Table 6 gives an example of egg production achieved with 3 different levels of management:

- *Low management*:
  little daily attention paid to the ducks; a small amount of supplementary feeding is given.
- *Medium management*:
  ducks checked every day; ones that look bad are checked more often; a good amount of better quality feed is given each day.
- *High management*:
  the ducks are checked regularly; unhealthy looking ducks are checked closely and set apart if necessary; high quality feed supplement used.

*Table 6:* *No of eggs produced using 3 levels of management - based on a flock of 25 duck in Thailand*

| period from start egg laying | low management | medium management | high management |
|---|---|---|---|
| first ½ year | 11 | 14 | 17 |
| second ½ year | 8 | 12 | 15 |
| third ½ year | 6 | 9 | 12 |

Ducks lay more eggs during the first half year of their laying period than at the end of one and a half years. If all the ducks are of the same age, and therefore start laying around the same time, you will notice that the number of eggs laid decreases after a time.
If you want a continuous production you should have a flock of ducks of different ages. Continuously you cull the unproductive ones and replace them by young layers. Depending on your duck keeping system you might also decide to use a all-in-all-out culling system.
See Section 2.4 about maintaining a flock and culling.

Some ducks may even stop laying for a while. If they lose feathers and grow new ones they are moulting. This is generally a rest period for ducks. If they are well cared for they will start laying again after about six weeks. If this does not happen, something else may be wrong and you should look for other reasons why the ducks are not laying eggs.

## 8.3 Meat

You can sell meat of layers, which have stopped laying eggs. Or you may choose to raise ducks specially for meat. The latter is called broiler production.
The difference in meat production between layers and broilers is that the layers are older when they are slaughtered. Therefore the meat of layers is tough compared to broiler meat which is more tender. Broiler meat falls apart when boiled, it is more suitable for frying or roasting.

### *Selling ducks live or ready slaughtered*

Whether you sell laying ducks or broilers you have to decide how you are going to sell them. You can sell ducks live or ready slaughtered, depending on what your customers prefer.
If you sell the ducks live, the easiest way to catch them is to not let them out of the shelter in the morning. Later in the day you can put them in crates or boxes with holes and take them to market.
The big advantage of selling live ducks is that the meat will not go off before they are sold. If you encounter unexpected problems on the way to the market, which result in the journey taking longer, you at least do not have the extra problem of spoilt meat. However, if there is no market for live meat you will have to slaughter yourself.

## 8.4 Slaughtering ducks

### *Age for slaughter*

The best age to slaughter broilers is the moment when the ducks are fully grown: about 8 weeks for Peking females to 9.5 weeks for Peking males, and about 10 weeks for females and 12 weeks for males of other types. This is also the point at which the breast meat is at its best. Of course it is possible that customers prefer tougher meat, and are willing to pay for this. Then it will be worth waiting a few weeks before slaughtering. Non-productive layers you can slaughter any time.

### *Preparation for slaughtering*

Before slaughtering a duck it is advisable not to give it food for at least six hours. Do make sure that the duck has water in this time. After six hours the duck's stomage and intestines will be nearly empty which makes cleaning the carcass much easier. If the contents of the stomach or intestines come in contact with the meat they will spoil the taste and quality of the meat.

### *Slaughtering*

If done correctly, the quickest and best method of slaughtering ducks is to cut or chop the throat. If you slaughter according to Muslim law you must not break the neck of the duck, but cut the head off with one clean cut. After this you can let the blood drain out of the duck.

Whichever slaughter method you use, you must drain the blood out of the body in order to make sure the meat is of good quality. You can hang the duck up by its feet to let the blood drain out. There are also special draining racks available (see Figure 18) in which you can hang the ducks head down.
Once all the blood has drained out of the body the duck can be plucked. It is easy to pull the feathers out while the body is still warm. To make plucking easier you can also plunge the carcass into hot water (at about 55°C) for about two minutes. Begin by taking out the large wing feathers. Then pluck the back, side and stomach feathers. Do the legs, neck and the rest of the wing feathers last. You can remove any remaining stomach contents by pressing down on the front side of the duck.

In order to make a carcass look neat and ready to be sold, you can cut off the head and take out the insides if customers prefer this. If you remove the insides be careful not to break the gall bladder, as the bile will spoil the taste of the meat.

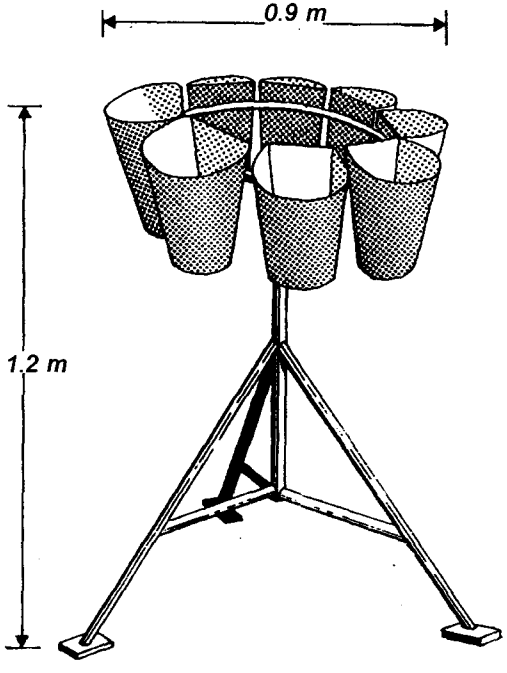



*Figure 18: Draining rack (Source: MAFF,UK, 1980)*

## 8.5 Manure

Ducks also produce manure. This can be used in the same way as cow dung or manure, on the fields. When you clean out the shelter you can put the mixture of litter and droppings on a pile and allow it to decompose before using it on crops. This improves the quality of manure as fertiliser material.

Duck manure can also be used directly, for example in a system where duck keeping is combined with fresh water fish farming, or where ducks are kept in a rice field. See Section 4.2 and 4.3.

# 9 KEEPING FARM RECORDS

## 9.1 Keeping records

It is worth keeping a record of what happens on your farm. Not every one finds keeping records easy or useful, it seems a hassle. Normally for a short term and for a small flock you can remember the most important information. But if you are planning to keep ducks for a longer time and if you want to continually conduct an optimal business you need to keep track of what happens.

Depending on your type of business you can keep track of:
- how many eggs are laid every day
- how much food you give every day
- the costs you make on feeding and health care
- the investment you have made to build a shed
- which ducks are good breeders and which are not
- how many eggs you incubate and the date you have put them to incubate
- how many eggs hatch
- how many of the hatched ducklings survive and how many die

This is not a complete list, neither a compulsory list. You decide yourself of which information you keep a record, depending on the type of your business.
The information you gather can help you to make management decisions or help you to find a solution to a problem. For example:

- When you know when you put eggs to incubate, you can calculate the date that they will hatch. You can then prepare for caring for the ducklings in time..
- You can estimate when you will need to replace ducks as they reach the end of their productive period.
- When production seems to decrease in a certain season, you can look at your records for the same time in the previous year to see if this is the case. If you can be sure that production has indeed decreased, then you can start to look for a cause for the decrease and possibly for a solution to the problem.

- Perhaps your ducks have seemed less healthy than usual for a while, weigh less or are growing more slowly than usual.
  At first you might think that the ducks are sick. Before calling in the veterinarian you could first check from your records whether you have been giving the ducks less feed than previously.
  If the ducks immediately look healthier and put on weight when you give them more food, you will know that they were not sick, but just needed a little bit more food.
- It is also worth keeping records for broiler ducks. If you keep a record of the weights (e.g. weekly) you can see quickly whether your flock of ducks is growing well.
- By keeping a record of all the costs you have made, you are able to calculate the cost price of your products. You are also able to see if your business is profitable or not.

Just take a note book or exercise book and write down everyday what you have done. If you use a more advanced way, then you can make lists for certain topics. Design it so that it is easy for you to use and easy to find the information again.

## 9.2 Calculating the cost price

The information about the costs you have made can be used to calculate the cost price of the products of your ducks. Once you have made cost-price calculations you can compare these with the price you get in the market. Then you can decide whether duck keeping is profitable for you. Don't forget that your cost price should be below market price, you have to earn something!

The outline below shows the information you need to collect to calculate the cost price.

| Variable costs | Fixed costs |
|---|---|
| purchase of ducklings | |
| cost of feed | |
| petrol/electricity | housing/shelter |
| health care | equipment |
| other (e.g. repairs on the building) | |

Labour costs are not included but the return on the duck keeping activity should be a reasonable payment for the time you invest in it. Of course there is a difference whether duck keeping is your main income generation or a side activity.

## *Variable and fixed costs*

The division made above between variable and fixed costs is an accounting technique. When accounts are kept or the farm administration becomes more complex then this division is usually made.

- *Variable costs*
  Variable costs are costs that are made for the daily farming activities. They change when the size of production changes or when production conditions change. Variable costs are: costs for feed; - medicine; purchase of new ducklings; energy etc. For example: The costs for feed will double if you keep 100 instead of 50 ducks.

- *Fixed costs*
  Fixed costs are those costs that do not depend directly on production activities. Fixed costs normally are investment costs for buildings and equipment. For example: Costs for a building will be nearly the same if you keep 50 ducks or 100 ducks.
  Fixed costs you make only once for a longer period. The investment for a building is made for maybe 5 or 10 years. Repairs on the building are variable costs: Costs on repairs will be higher when the building is used more intensively.

When you calculate the cost price you calculate part of the fixed costs - the depreciation costs - these depend on the number of years the investment is planned to last. If you have taken a loan with interest, the interest rates have to be taken into account as well.

If you only want a simple overview of your costs, and if you haven't made large investments, it is not really necessary to make this division between fixed and variable costs. You can simply write down all costs and add them up.

## 9. 3 An example of calculating the cost price

To avoid confusion we have taken an imaginary type of money: M.
1M means one unit of money.
The prices used in the examples will be different from prices in your area, which means that the figures you get from your own calculations will also be different from the ones in the examples.
This example is made very simple. The aim is to give you the idea of cost price calculation.

In the example below calculations are made for one whole laying period. The ducks start to lay eggs at 5 months old and continue to lay until they are 18 months (1½ years). This means that the total laying period is 8 months (56 weeks).

*Costs on a farm of 100 ducks - 18 months*

| | |
|---|---|
| *Variable costs* | |
| Purchase of ducklings- 5M per duckling | 500 |
| Feed | 1560 |
| Electricity | 15 |
| Medicines or veterinary care | 30 |
| Litter | 40 |
| Transportation to the market | 35 |
| Sub total | 2280 |
| *Fixed costs* | |
| Construction of shelter, run + pool | 3000 |

You have planned your building to last for 5 years, this means that you have to earn back 600 M per year to compensate for the investment you have made. The period you keep the ducks is 18 months, this means that over this period you need to earn back 900 M.
(For the sake of simplicity we do not include interest rates here.)

Total costs made in this laying period therefore are:
2280 + 900 M = 3180 M.

## *Production*

Over this laying period the total production of eggs has been: 3850
You will also sell the meat (and possibly the manure). In the case of laying ducks the meat in fact is a by-product.
In this example you will sell 70 ducks ( some will have died, others you have used for your own consumption).
Income from the meat is 18 M per duck.

| | | |
|---|---|---|
| Sales of meat : | 70 x 18 = | 1260 M. |
| To calculate the price of an egg: | | |
| Costs made: | | 3180 M |
| Income from meat: | | 1260 M |
| Net costs: | | 1920 M |
| Cost price of an egg: 1920 / 3850 = 0.50 M | | |

Of course you can also make the calculation the other way round. If selling eggs is less important than selling meat, then you subtract the income from eggs from the total costs. The total net costs remaining you then have to earn back by selling duck meat.

If you have a continuous production system in which you keep ducks of different ages together (see Section 2.4 on Maintaining a flock), you can calculate the cost price per egg over a set period.
At the end of a period (a week or a month) you calculate all the costs you have made and all the income you have earned. By doing this you can see whether you have made a profit or a loss.

If you have bought a larger amount of feed, to feed your ducks for a longer period, be careful when calculating the cost price.
If the price of the feed has gone up since you bought it , you have to use the actual, higher price in your calculations. Because soon you will have to buy this more expensive feed again and now you already have to earn the money for it.

## 9.4 Analysing your business over more seasons

In this example we give a production schedule of a business in an area which has two rainy seasons in a year.
The first dry season, from November to the end of January, is a little longer than the second, which is in May and June.
The longer dry season is also more severe (drier) than the shorter one. This is also reflected in the number of eggs laid each day in these two seasons.

### *Example 1*

By comparing the daily production figures (*) for January in Years 1,2 and 3, you can see that the dry season was drier in Year 2 than in Year 1.
In Year 2, only 4 eggs per day were laid on average, compared with 8 in Year 1 and 7 per day in Year 3.
From your figures you would notice a decrease in egg production in January of Year 2, and you could look back at the figures for January of Year 1. You would be able to see that 4 eggs is far less, but in this case you would not be able to do much to improve the situation, as the weather is not something you can control.

### *Example 2*

In Year 3 at the beginning of March there was nothing unusual to see in your figures. However, about half way through the month the ducks started to lay less eggs. By the end of the month the average daily figure (**) was lower than for the two previous years, when you compared records. By then looking carefully for the reason for this decrease in egg production, you noticed that the feed you were using for the ducks had gone mouldy. This meant that the quality of feed had decreased and the ducks laid less eggs.

These examples show how you can use well-kept records to help you quickly check whether your production is going as you expect. After keeping records for a number of years you can also start to predict how many eggs your ducks are likely to produce.

*Table 7: Analysis of egg production (flock of 20 ducks)*

| Production | | Dry season (severe) | | | Rainy season (short) | | | Dry season (light) | | | Rainy season (long) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Year1 | Daily | 16 | 10 | 8* | 10 | 16** | 16 | 16 | 14 | 15 | 16 | 17 | 17 |
| | Monthly | 480 | 310 | 480 | 280 | 496 | 480 | 496 | 420 | 450 | 496 | 510 | 527 |
| | | | | 1270 | | | 1256 | | | 1366 | | 1533 | |
| Year2 | Daily | 16 | 10 | 4* | 10 | 16** | 17 | 16 | 14 | 16 | 17 | 17 | 17 |
| | Monthly | 480 | 300 | 124 | 280 | 496 | 510 | 496 | 420 | 496 | 527 | 510 | 527 |
| | | | | 904 | | | 1286 | | | 1412 | | 1564 | |
| Year3 | Daily | 15 | 10 | 7* | 11 | 12** | 16 | 16 | 13 | 15 | 16 | 17 | 17 |
| | Monthly | 465 | 300 | 217 | 308 | 372 | 480 | 496 | 390 | 465 | 496 | 510 | 527 |
| | | | | 982 | | | 1160 | | | 1351 | | 1533 | |

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# GLOSSARY

| | | |
|---|---|---|
| algae | - | small water plants on which fish feed |
| broody ducks | - | ducks ready to remain seated on their eggs until they hatch |
| culling | - | to take ducks out of the flock because they are too old or sick |
| drake | - | male duck |
| duckling | - | young duck, up to 8 weeks old |
| emetic | - | drug to make ducks empty their stomach, used in case of food poisoning |
| fixed costs | - | costs that are made in an business and which don't vary every month. |
| gall bladder | - | organ in the body in which gall is stored, gall is essential in the digestion of food |
| to hatch | - | the breaking of the egg to let the duckling out |
| immunity | - | unability to be harmed by a disease because of resistance within the own body. |
| to incubate | - | to keep the egg warm untill the duckling has developed enough to emerge |
| nutrition | - | the scientific word for feeding and how food is utilized in the body |
| proteins | - | a nutrient substance present in foods such as meat, eggs and beans. Proteins help build the body and keep it healthy. |
| protuberances | - | irregular swellings, outward from the surrounding body |
| variable cost | - | costs that vary every month according to the size and conditions of production. |
| virus | - | microscopic (very small) organism that causes diseases in other living organisms. |