

## CHAPTER ONE

### Introduction

The domestication of fowl took place between 8000 to 3000 years BC. Archaeological evidence indicates that fowls were domesticated in the Indus River Valley (present Pakistan) as early as 3250 BC (Moiseyeva, 1998). The distribution from east to west most probably was along the silk route during the 6<sup>th</sup> and 8<sup>th</sup> Centuries BC, via Turkistan, Iran and then to the Mediterranean region and central Europe. The wild species of *Gallus* that may have contributed to the domestic fowl include the Red Jungle Fowl (*Gallus gallus*), Grey Jungle Fowl (*Gallus sonneratii*), Ceylon Fowl (*Gallus lafayettei*) and the Green Fowl (*Gallus varius*). Studies on morphological characteristics such as comb and feathers have shown similarities between the Red Jungle Fowl (*Gallus gallus*) and the domestic fowl. Geneticists therefore generally accept the Red Jungle Fowl as the common ancestor of the domesticated chicken (Crawford, 1990).

The historical records indicate that the initial domestication of the fowl was primarily for cultural and religious purposes. Fowls were kept for feathers, white and black magic and fighting, which must have influenced the selection of the birds, especially in terms of colour and morphology (Crawford, 1990). From the centers of domestication, chickens were distributed to other continents, cultures and environments, that led to the development of specific regional types. During the 19<sup>th</sup> Century, poultry in general became very popular in Europe and America as a hobby and a fair amount of money was invested in acquiring breeding stock. Crawford (1990) refers to the “hen craze of the 19<sup>th</sup> Century” as the time when most varieties, which still exist, were developed. It was only during the 20<sup>th</sup> Century that the poultry industry developed into a commercial industry and attention was directed to eggs and meat as products. Poultry, especially chickens, were now selected for improved production and the advances in breeding and genetics were applied for developing strains for egg (layer) and meat (broiler) production.

The introduction of the domesticated chicken to Africa and South Africa is not well documented. It is believed that chickens were used in rituals in Egypt during the Greco-Roman period (332 BC). Recent findings of skeletal remains in Qasr Ibrim by MacDonald & Edwards (1993) now indicate that the earliest known remains of the fowl in Sub-Saharan Africa can be traced to the late 5<sup>th</sup> Century AD. However, faunal samples have shown that fowls were associated with Early Iron Age communities (ca. 1000 BC) in southern Africa (Plug, 1996). Various domesticated chicken breeds were introduced from Europe during the era of African colonization, leading to extensive mixing of local and domesticated chicken populations.

The poultry industry in South Africa developed into a major livestock industry over the past 20 years. A major factor that contributed to this expansion was the higher demand for poultry meat, as it has become the “healthier” choice of meat world-wide. Other contributing factors include the advances made in monogastric nutrition, selection of more efficient, higher producing broiler and layer lines as well as improvement in poultry housing.

The industry is characterized by primarily large commercial enterprises, making use of high technology inputs such as environmentally controlled housing and intensive feeding and management systems. Forty-seven percent of all layers are owned by only two percent of all the egg producers in South Africa and eighty percent of the producers own less than 50000 layers (Deiner, 1999). A similar situation exists for the broiler industry where a few large companies produce approximately 80 percent of all broilers. The commercial broiler industry produces 928000 tons of meat and the layer industry 316000 tons of eggs per year. *Per capita* consumption of chicken and eggs are estimated at 22.9 and 6.59 kg per year (<http://www.nda.agric.za>).

Despite the extent of the commercial industry, fowls are found in most rural and peri-urban households in South Africa. These birds consist mostly of dualpurpose lines or what is also referred to as indigenous, local, native or “village chickens”. They survive on a few kitchen scraps and the occasional handful of maize, but for most of the time

they are left to scavenge. Flock size may vary between 5-20 birds. These native birds should be a valuable source of protein in terms of eggs and meat for rural populations, although their exact contribution to household food protein and or food security will be relatively difficult to estimate.

The changes in the political and socio-economic scene the past four to six years also brought challenges for agriculture in South Africa. In the past very little scientific research has been carried out on rural farming and alternative farming practices for household food security. Since 1994, agricultural policies have been directed towards rural and small scale farming systems and animal scientists are required to pay more attention to breeds that may lead to improvement of rural production. Indigenous and native breeds are now being re-evaluated as alternatives to the exotic breeds for application in rural farming systems.

During 1994, a project was launched by the Poultry Supply Unit of the Animal Improvement Institute of the Agricultural Research Center at Irene, to conserve the native chicken populations found in South Africa and to promote their re-introduction to rural agriculture (Joubert, 1996). The project referred to as "Fowls for Africa" include a number of different native populations, such as Lebowa-Venda, Ovambo, Naked Neck and Koekoek, as well as middle-level breeds for example New Hampshire, Rhode Island Red, Australorp and Cornish (Honeyborne [personal communication], 2000).

The native fowl populations that formed the conservation population at ARC (Irene) were originally collected from rural areas of the Northern Province, KwaZulu-Natal, the Free State and eastern- and southern Cape. The fowls from the Ovambo population were collected in Ovamboland in Namibia. The New Hampshire population included in the program came from the population, which was kept as a benchmark in the egg performance tests at the ARC (Irene) for many years. All these populations are being kept as a conservation population, according to the FAO guidelines in terms of population size to control inbreeding (Honeyborne [personal communication], 2001). The Koekoek, Lebowa-Venda, Naked Neck and Ovambo populations, as well as New

Hampshire and Australorp from the program were included to determine genetic variation and relatedness.

The interest in the native fowl in South Africa and southern Africa is of a binary nature. There is firstly a need to genetically characterize these populations for guidelines on their conservation. Genetic characterization is essential in estimating the relatedness among the populations which will assist in breed identification, selection for improved lines and planning of future conservation of these populations. Secondly, a phenotypic characterisation for growth and egg production will also assist in selection and improvement of these populations for application in rural agriculture.

### Aims of study

There is a world-wide tendency to conserve and preserve native livestock species. Many species in the wild have reached the point of extinction with the corresponding loss of valuable genetic resources. In farm animals, especially chickens, breeders are continuously selecting for improved production, resulting in the reduction of genetic variation and the loss of unique alleles associated with disease resistance. A better understanding of the genetic variation and potential of the stock native to South Africa are therefore essential for informed decision making in conservation efforts.

No research has been done on the production potential and genetic make-up of the different native populations commonly seen in the rural areas of South Africa. For many years the emphasis was on the commercial production of poultry and native fowls were disregarded as research subjects. It was generally assumed that these fowl are all related and because of their poor production not worth conserving. It was decided to evaluate the native populations from the “Fowls for Africa” project with particular reference to their production traits and their genetic relatedness and variability.

In particular, this study represents the first genotypic analyses and comparison of native fowl populations in South Africa. For this purpose, a number of markers have been identified, evaluated and applied. Phenotypic trials were conducted only for baseline

data. Evaluation of the populations in different production systems was beyond the scope of this study.

It is my belief that the native fowl have an important role to fulfill in rural agriculture as well as contributing to genetic biodiversity of fowl in South Africa. The study of these fowl was driven by the questions that have been raised on their conservation and the recognition that they deserve in their contribution to securing food for the rural household.