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# Indirect Selection Amongst Small Scale Holders of West African Dwarf (WAD) Goats Based on Coat Pigmentation and Wattle Types in Ogbomoso, Nigeria

Research Article

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## ABSTRACT

A research study was carried out on the indirect selection efforts amongst small scale holders of West African Dwarf (WAD) goats based on coat pigmentation and wattle types in Ogbomoso, Nigeria using personal interviews and structured questionnaires given using simple random on-farm techniques. The questionnaires were focused on the ownership distribution, preferred pigmentation and wattle types, disease susceptibility, death status, kidding status and market sales regarding coat pigmentation and wattle types. The questionnaires revealed that WAD goats with black pigmentation and two wattles had the highest ownership distribution, most preferred and better priced. It further revealed that black goats were highly diseased and died more, although this could be as a result of the preponderance of black goats in the study area. However, the respondents revealed that goats with two wattles were not easily susceptible to disease and lower deaths were often recorded. This showed that indirect selection of WAD goats based on coat pigmentation and wattle type is constantly going on amongst the small scale holders of WAD goats and this could be utilized for the breed genetic improvement.

**KEY WORDS** coat pigmentation, selection, small scale holder, wattle, WAD goats.

## INTRODUCTION

The West African Dwarf (WAD) goat, a predominant breed of the humid and sub humid zones of Nigeria is characterized by small size with matured body weight varying between 20-25 kg, hardy and possessing the ability to survive, adapt and reproduce under harsh conditions (Ozoje, 1998). The majority of WAD goats in Nigeria are found in the rural areas where they serve as a source of income and meat to the rural populace. These animals are left to roam about or scavenge for themselves with an occasional offering of farm residues, kitchen waste and processing waste. The rural people live below poverty line which reflects in their care free attitude towards rearing, breeding and health status of this animal. WAD coat color vary widely ranging from black, brown to white and combinations of these colors in varying proportions (Ozoje, 2002) and this large variation has been attributed to the lack of selection efforts directed towards the choice of color (Odubote, 1994a,b). Coat color a highly repeatable and heritable (53%) trait is majorly controlled by alleles on three loci (A, B and S) although genes on the extension locus (E) tend to modify the effect of these alleles (Adalsteinsson *et al.* 1994). The use of coat color traits of animal to measure livestock perform-

ance is now gaining wider application (Horst *et al.* 1988). These authors inferred that the use of qualitative traits might offer a cheap and indirect method of improving production performance of our indigenous livestock. Casu *et al.* (1970); Osinowo *et al.* (1990) and Odubote (1994a) concluded in their various studies that wattle is inherited as a simple Mendelian autosomal dominant with complete or incomplete penetrance and variable expressivity. Wattles are usually placed symmetrically one on each side of the throat just behind the lower jaw or at the upper part of the neck. The position may vary, however, some being situated down the neck and others nearer the head. Wattles also vary much in size in different species, strains and individuals. The color of wattles usually followed the predominant coat color.

In spite of the importance of qualitative traits (coat color and wattle) in measuring livestock performance and in addition to various isolated studies (Osinowo *et al.* 1988; Odubote, 1994a; Ozoje and Mgbere, 2002) conducted both on-station and on-farm in Nigeria and with the existing coat pigmentations amongst WAD goats, it could therefore be concluded that the occurrences of coat color and wattle types are still under the influence of nature. However, this study seeks to examine the authenticity of this statement by considering some factors which perhaps could reveal the indirect contributions of small scale holders of WAD goats to its genetic improvement.

## MATERIALS AND METHODS

The study was carried out in Ogbomoso (Latitude $8^0$ 15'N of the Equator and Longitude $4^0$ 15'E of the Greenwich meridian: 300-600 mm above the sea level) area of Oyo State Nigeria. The area is a derived savannah agro-ecological zone with a fairly uniform temperature, moderate to heavy seasonal rainfall and relative humidity. The average annual temperature and rainfall are 27 $^0$C and 1.247 mm respectively (Oguntoyinbo, 1988). Ogbomoso consist of five local government areas comprising; Ogbomoso North, Ogbomoso South, Oriire, Ogo-Oluwa and Surulere. The study was focused on West African Dwarf goats found within Ogbomoso community, Nigeria. The animals were on free-range and they were fed with kitchen wastes, whole cassava, corn chaff, cassava peels and there were neither deliberate veterinary nor nutrition intervention of the health status and feeding of these animals. Minimum shelter was provided for the animals. Simple random sampling technique was employed to select goat owners within each local government and the duration of the study was thirty days. Each local government has ten political wards and this was used for ease of sampling and administrative convenience. Owners possessing four to ten goats (small scale holders) were allotted into sampling frame of ten and three owners were randomly selected in each of the sampling frame by drawing lots. The questionnaires were constructed based on the background information of the goat owners in the study area and this was obtained at the Oyo state Agricultural Development Project (OYSADEP) office, Ibadan, Nigeria. The questionnaires were jointly done with the extension field officers of the above office. Thirty goat owners were randomly selected per local government area thus making a total of 150 goat owners in all the five local government areas studied and there were average of three hundred goat populations in each local government making total average of one thousand and five hundred goats. Information on number of goats, ownership distribution, ownership preference, feeding, housing, kidding, mortality rate, sales of the goat, level of disease susceptibility and feeding in relation to coat pigmentation and wattle type were collected from goat owners through structured questionnaires, on-farm visits and personal interviews. The information obtained were analyzed using the descriptive statistics of SAS (2003).

## RESULTS AND DISCUSSION

Table 1 shows the respondents' response on the use of coat pigmentation and wattle type as basis for indirect selection of West African Dwarf goats amongst small scale holders in Ogbomoso, Nigeria. In all the variables considered, black pigmented goats had the highest respondents' values. Goats' ownership distribution spread across the entire coat pigmentation under study and interestingly, majority of the respondents (46.6%) preferred goats with black pigmentation and this clearly reflected also in their ownership distribution pattern. The least goats preferred and owned were those with white pigmentation. However, some respondents (13.3%) were averse to possessing goats with certain particular pigmentation. Amongst the coat pigmentations understudy, the respondents rated black goats high in their kidding rate and are a reflection of their rate of twining and triplets. The respondents' views on disease susceptibility of each goat with different coat pigmentations revealed that brown goats were least susceptible and this greatly reflected in their lower death rate. 6.7% of the respondents had encountered pricing variations of goats in market places based on coat pigmentation and black goats were highly priced followed by the brown goats. Regarding the wattle type, goats with two wattles were commonly owned; most preferred by the respondents and attract better prices in the markets. About 2.7% of the respondents were against possessing goats with just any wattle type and they majorly agreed that market price varied with wattle type. Interestingly, majority of the respondents agreed that goats without wattle were more susceptible to disease and consequently resulting into greater number of death.

**Table 1** Respondents' response on the use of coat pigmentation and wattle type as basis for indirect selection of West African Dwarf goats in Ogbomoso, Nigeria

| Variables based on coat pigmentation | Frequency | % | Variables based on wattle type | Frequency | % |
|---|---|---|---|---|---|
| **Ownership distribution:** | | | **Ownership distribution:** | | |
| Black | 65 | 43 | No wattle | 20 | 13.3 |
| White | 15 | 10 | One wattle | - | - |
| Brown | 25 | 17 | Two wattles | 130 | 86.7 |
| Mixture of pigmentations | 45 | 30 | | | |
| **Most preferred pigmentation:** | | | **Most preferred wattle type:** | | |
| Black | 70 | 46.6 | No wattle | 15 | 10 |
| White | 25 | 16.7 | One wattle | - | - |
| Brown | 30 | 20.0 | Two wattles | 135 | 90 |
| Mixture of pigmentations | 25 | 16.7 | | | |
| **Are you against any pigmentation:** | | | **Are you against any wattle type:** | | |
| No | 130 | 86.7 | No | 146 | 97.3 |
| Yes | 20 | 13.3 | Yes | 04 | 2.7 |
| **Housing based on pigmentation:** | | | **Housing based on wattle type:** | | |
| No | 150 | 100 | No | 150 | 100 |
| Yes | - | - | Yes | - | - |
| **Feeding based on coat pigmentation:** | | | **Feeding based on wattle type:** | | |
| No | 150 | 100 | No | 150 | 100 |
| Yes | - | - | Yes | - | - |
| **Kidding rate based on pigmentation:** | | | **Kidding rate based on wattle type:** | | |
| Black | 65 | 43.3 | No wattle | 30 | 20 |
| White | 15 | 10.0 | One wattle | 15 | 10 |
| Brown | 25 | 16.7 | Two wattle | 105 | 70 |
| Mixture of pigmentations | 45 | 30.0 | | | |
| **Does pricing depend on pigmentation:** | | | **Does pricing depend on wattle type:** | | |
| No | 140 | 93.3 | No | 143 | 95.3 |
| Yes | 10 | 6.7 | Yes | 07 | 4.7 |
| **Attraction of better pricing:** | | | **Attraction of better pricing:** | | |
| Black | 50 | 33.3 | No wattle | 10 | 6.7 |
| White | 30 | 20.0 | One wattle | 15 | 10.0 |
| Brown | 45 | 30.0 | Two wattle | 125 | 83.3 |
| Mixture of pigmentations | 25 | 16.7 | | | |
| **Disease based on pigmentation:** | | | **Disease based on wattle type:** | | |
| Black | 55 | 36.7 | No wattle | 78 | 52.0 |
| White | 32 | 21.3 | One wattle | 35 | 23.3 |
| Brown | 25 | 16.7 | Two wattle | 37 | 24.7 |
| Mixture of pigmentations | 38 | 25.3 | | | |
| **Death based on pigmentation:** | | | **Death based on wattle type:** | | |
| Black | 60 | 40.0 | No wattle | 75 | 50 |
| White | 25 | 16.7 | One wattle | 30 | 20 |
| Brown | 19 | 12.7 | Two wattle | 45 | 30 |
| Mixture of pigmentations | 46 | 30.6 | | | |

In humid and sub-humid environment with high ambient temperature and intense solar radiation, characteristics such as coat pigmentation play a vital role in the productive adaptability of livestock species (Peters *et al.* 1982). The ownership distribution of West African Dwarf goats that spread across the entire coat pigmentations under study showed that no conscious efforts has been directed towards the choice of any particular pigmentation. However, the respondent preference of black goats clearly revealed an unconscious selection efforts going on at the level of the small holders. The respondents had attributed their preference for black goats (male and female) based on their adap-

tation to the local environment, their way of life, good mothering ability and high prolificacy (rate of twining and triplets are high). Ebozoje and Ikeobi (1998) carried out a research on the effect of color variation on reproduction of extensively reared West African Dwarf goats in the humid zone of Nigeria and reported that black goats gave the largest litters both at birth and weaning and therefore concluded that coat pigmentation plays an important role in the adaptation and survival of the WAD breed. However, no matter the good performance of black goats in the study area, some respondents were greatly against rearing it and they attributed this to their belief that anything black is evil. They also reasoned that black goats were presently been used to appease the gods whenever the need arises and this was against their faith. The higher kidding rate of black goats as reflected in the respondents' views is not surprising because animals that survive more will produce more offspring from generations to generations and this could be a reflection of their adaptive advantage.

There is no available literature on the genetics of coat color and susceptibility to disease known to this author, however, the genes coding for brown pigmentation might have some suppressing effects on some diseases and this could be as a reflection of some gene actions such as epistasis or genetic linkage. Sanusi (2008) demonstrated this in the study conducted on the effect of coat pigmentation on fecal egg counts and *Haemonchus concortus* infestation of extensively WAD sheep in Nigeria. The author reported that brown sheep had the lowest fecal egg counts and helminthes infestation and therefore concluded that coat pigmentation could plays significant role in controlling helminthoses in livestock. However, Kumar and Khaliefa (1971) reported that lighter pigmented birds died more because they were unable to withstand the coolness of the night unlike the darker pigmented birds which absorbs heat during the day and dissipate it during the night. This could have accounted for the lower number of goats with lighter pigmentations in the study area especially white goats. The respondents reported that white WAD goats though good, however, they died in large number during the hammattan period when the environmental temperature is low. However, the high susceptibility to disease and high mortality of black could not be separated from the higher percentage of ownership distribution in the study area. Several researchers as cited by Akpere (2000) reported that wattles in mammals were made up of essentially different tissue and that livestock thrived without them just as well as with them and therefore concluded that mammalian wattle serve no useful purpose in the economy of various stocks. The ownership distribution that spread across the entire wattle types is an indication that wattle is inherited as a simple Mendelian autosomal dominant with complete or incomplete penetrance and variable expressivity (Osinowo *et al.* 1990; Odubote, 1994a). However, respondents in this study clearly showed their high preference for goats with two wattles and this was reflected in their ownership distribution. Reasons attributed to this was that goats without wattle were only reared by the idol worshipers right from the olden days and the belief was that such goats do not bring good tidings to their rearers. In addition un wattled goats were believed to be an aberration and they were quickly given out as gift to interested people. The reasons given by the respondents in respect of two wattled goats were that they survive and reproduce better with good mothering ability and are very docile. Odubote (1994b) had earlier reported on the docility of WAD goats with wattle and its usefulness in thermoregulation. This could be an important adaptive feature most especially in this tropical environment characterized by high ambient temperature. However, some respondents did not care about the number of wattles possessed by the goats as long as they were productive. Higher kidding rate of goats with two wattles as revealed by the respondents suggests the adaptive features of wattle in livestock and the linkage of wattle with reproduction. Casu *et al.* (1970) observed significantly higher lambing rate in ewes with wattle compared to ewes without wattles. The greater susceptibility of non wattled goats to various forms of diseases with its attendant death could be as a result of genetic linkage between wattle and diseases. Richard *et al.* (1990) reported a significant reduction in the fecal output of strongyle eggs in Alphine and Saanen goats and the author suggested an advantage of wattled goats in the form of genetic resistance to helminthoses. Significantly higher market price of goats with two wattles could be attributed to the respondents' perception of good performance of this category of goats in terms of adaptation, mothering ability, belief and customs of the small scale holders.

## CONCLUSION

In view of the respondent' higher percentages of preference and ownership distribution in favor of black and wattle WAD goats amidst presence of various coat pigmentation and wattle type amongst small scale holders. It can therefore be concluded that unconscious indirect selection efforts of WAD is going on at the small scale holders' level and this could be utilized for their genetic improvement.

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