

Consumers' Preference for "Bicycle Poultry" in Bénin: implication for designing breeding schemes

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ABSTRACT: Village poultry, also termed "bicycle poultry" because it is produced in scavenging farming systems, has preferred juicy meat with low fat content and constitutes an important source of meat in many African countries. This study aims to understand reasons underlying consumers' preferences for physical traits of these birds and how research can value the features preferred by consumers in the improvement of their performance. For this purpose, the hedonic price method was applied on field data collected at retailers' level in four urban and five rural markets in Benin. Results showed that consumers' preference for bicycle poultry is much more a traditional perception of their organoleptic and dietetic qualities, and their cultural values. Consumers are also more interested in meatier birds that are aged between six and twelve months, and with white plumage. Efforts to improve local poultry breeds should include those traits preferred by consumers into the breeding goal.

Keywords: village poultry; consumers' preference; willingness to pay; breeding traits

Introduction

Village poultry constitutes an important source of meat in many developing countries. Indeed, it represents up to 90% of poultry products in these countries (Alabi et al., 2006). In Benin, this bird, also termed "bicycle poultry" because it comes from scavenging farming systems and has chewy meat with low fat, represents the second most common source of meat after beef, with 17% of the meat supply (DE/MAEP, 2008). It has broad consumers' preference, and unlike the local production of improved poultry, does not suffer significant competition from imports of European poultry meat (Chrysostome and Sodjinou, 2005; CTA, 2008). The productivity of indigenous poultry, however, is low in addition to poor breeding levels.

Due to the importance of indigenous poultry in meat supply and in income generation for rural households especially, various programs have been implemented to improve their productivity. Unfortunately, most of programs implemented for this purpose, e.g. the introduction of improved cockerels, have failed mainly because they do not take into account the poultry features traditionally preferred by consumers (Sodjinou, 2011; Sodjinou and Henningsen, 2012; Vidogbèna et al., 2010). This failure is also due to the lack of information on these preferences.

The objective of the present study is to understand reasons that underlie consumers' preferences for physical

traits of indigenous poultry (chicken, duck and guinea-fowl) and how research can value the features preferred by consumers in the improvement of the performance of indigenous poultry.

Materials and Methods

Theoretical framework: In Becker's (1965) and Lancaster's (1966) consumer theories, consumers have preferences for characteristics of bicycle poultry. In other words, consumers can compare various bundles of poultry and decide which bundle gives them the greatest pleasure (Perloff, 2011). They choose the birds through utility maximization with respect to the goods' consumption characteristics (Laroche Dupraz et al., 2008).

Various studies have relied on Becker's theory in order to understand consumers' willingness to pay for different goods' attributes, especially when the quality is not directly valued by the market (Laroche Dupraz et al., 2008). In practice, one often analyzes the good's price variation over its characteristics. The statistical method available for the analysis of price variation over product's characteristics is the "hedonic price". Jabbar (1998) used this method to reveal goat and sheep attributes that determine consumer preferences in Southern Nigeria. Orden et al. (2005) also used hedonic regression to analyze traders' preferences for goat characteristics in the Philippines.

The hedonic price analysis aims to disentangle various attributes from one another for the purpose of estimating implicit prices (Andersson, 2000). Its subjacent assumption postulates that each good is characterized by a set of traits. For a given good, the hedonic regression can be written as:

$$p = f(x) \quad (1)$$

where $x = (x_1, \dots, x_k)'$ is the vector of traits for the good, and p its price. There is no "a priori" rule about the inclusion of quality characteristics in the model, but the characteristics included should be observable and economically relevant to the buyers (Orden et al., 2005). The characteristics used in this study were identified from semi-structured discussions with poultry traders in an exploratory phase.

The implicit or hedonic prices are the partial derivatives of the hedonic function of equation 1:

$$\frac{\partial p}{\partial x_k}(x) = \frac{\partial f}{\partial x_k}(x) \text{ with } k = 1, \dots, K \quad (2)$$

Data used: The study has been carried out in Benin, a tropical West African country between the 6th and 12th parallels of north latitude and between the 1st and 4th Meridian of longitude. Data used were gathered on nine markets: three rural and two urban markets in the Southern part, and two rural and two urban markets in the Northern part. These markets were sampled by Sodinou (2011) in order to assess village poultry producers' access to market. In each market, a list of poultry traders operating in the market was made with the help of key informants. Afterwards, traders were sampled at random: 10 in each rural market and 20 in each urban market. In short, a total of 130 village poultry traders were interviewed during marketing transactions of poultry. About 85% of traders were selling chickens, 29% were marketing ducks and 25% were trading guinea fowls.

Data analysis: The exponential functional form was used to estimate the relationship between price and bird attributes. The model is described as:

$$\ln p = \ln \beta_0 + \sum_{k=1}^K \beta_k x_k \quad (3)$$

where p is the price of the live bird in FCFA¹, and x_k are the bird's attributes. Nine attributes are used in the hedonic regression for chickens (table 1). Table 1 shows that about 38% of interviewed consumers have purchased indigenous chickens and 37% of chickens were white-feathered whereas 27% have black plumage. Purchased chickens, of which 48% were male, weighed 1.5 kg on average. About 53% of chickens were 6 to 12 months old and 32% were less than 6 months old. Finally, 19% of chickens had long legs and 29% were highly meaty.

Table 1. Variables used in the hedonic regression, along with hedonic prices equations and the descriptive statistics

Var.	Label	Hedonic prices	Mean ^(a)		
			Chicken (n=110)	Duck (n=37)	Guinea fowl (n=33)
x_1	Breed (1 = indigenous, 0 = crossbreed)	$\frac{\partial p}{\partial x_1} = (\beta_1 + \gamma_{15}x_5)p$	38.2%	ND	ND
x_2	White color of the plumage (1 = white, 0 = otherwise)	$\frac{\partial p}{\partial x_2} = \beta_2 p$	37.3%	40.5%	57.6%
x_3	Black color of the plumage (1 = black, 0 = otherwise)	$\frac{\partial p}{\partial x_3} = \beta_3 p$	27.3%	37.8%	30.3%

¹FCFA: Benin currency. Euro 1 ≈ FCFA 655

x_4	Sex of the bird (1 = male, 0 = female)	$\frac{\partial p}{\partial x_4} = (\beta_4 + \gamma_{45}x_5)p$	48.2%	37.8%	60.6%
x_5	Weight (in kg)	$\frac{\partial p}{\partial x_5} = (\beta_5 + \gamma_{15}x_1 + \gamma_{16}x_4)p$	1.5 (0.7)	2.7 (1.2)	1.7 (1.0)
x_6	Height on leg (0 = short, 1 = long)	$\frac{\partial p}{\partial x_6} = \beta_6 p$	19.1%	29.7%	87.9%
x_7	Meatiness (1 = highly meaty, 0 = otherwise)	$\frac{\partial p}{\partial x_7} = \beta_7 p$	29.1%	51.4%	57.6%
x_8	Age of the bird (1 = between 6 and 12 months, 0 = otherwise)	$\frac{\partial p}{\partial x_8} = \beta_8 p$	52.7%	56.8%	51.5%
x_9	Age of the bird (1 = less than 6 months, 0 = otherwise)	$\frac{\partial p}{\partial x_9} = \beta_9 p$	31.8%	ND	ND
y	Price of the bird (Fcfa)		2119.1 (950.2)	3673.0 (1310.4)	2781.8 (1177.5)

For ducks and guinea fowls, variables x_1 (breed) and x_9 (age less than 6 months) were not used because only indigenous breeds were available on the market. Table 1 indicates that the color of the plumage was white for about 41% of ducks and for 58% of guinea fowl. The black color was noted for 38% of ducks and 30% of guinea fowl purchased by consumers. Over a third of ducks were males and 57% were between 6 and 12 months old. Regarding the guinea fowls, 61% were male and 52% were between 6 and 12 months of age.

Furthermore, it is possible for the elasticity of the poultry price with respect to a given attribute to depend upon the magnitude of yet another attribute. For example, the elasticity of the chicken price, with respect to its live-weight, might depend on its sex. To test this type of assumption, two interaction terms were introduced in the hedonic price model. For chickens, equation 3 can be rewritten as:

$$\ln p = \ln \beta_0 + \sum_{k=1}^K \beta_k x_k + \gamma_{16}x_1x_6 + \gamma_{36}x_3x_6 \quad (4)$$

For ducks and guinea fowls, only the interaction between the sex and the live-weight was introduced in the model since the variable x_1 (i.e. breed) was not taken into account for these birds. Thus, equation 3 can be rewritten as:

$$\ln p = \ln \beta_0 + \sum_{k=1}^K \beta_k x_k + \gamma_{36}x_3x_6 \quad (5)$$

Equations of the hedonic prices are summarized in the third column of table 1. Ordinary least-squares regression was used to estimate the functions of equations 4 and 5.

Results and Discussion

The 'breed of the bird' has a positive and significant ($p < 0.01$) effect on chicken price. Chicken price tends to be 22% higher for indigenous chicken, which indicates that consumers were willing to pay roughly FCFA 342 more for indigenous chickens than for crossbreds. This result supports those of Djondo (2001) and Kyarisiima *et al.* (2011) who, respectively, found that 90% of interviewees in Benin and 80% of chicken consumers in Uganda prefer local chicken meat to that of the exotic poultry. This can be explained by the consumers' perception of indigenous chicken. Indeed, during the focus group discussion carried out in this study, people stated that consumers from urban areas prefer indigenous breeds not only for their organoleptic qualities (tastier and with a nicer smell), but also for their dietetic qualities. In the latter case, consumers think that local chicken does contain less fat than improved chicken, and thus its consumption is suitable for diabetics. In other words, the perceived link between the consumption of indigenous poultry and health is an important determinant of consumers' – notably the urban wealthy consumers – preference for bicycle poultry. This is what Lähteenmäki *et al.* (2010) call function claims that are based on existing knowledge on links between indigenous poultry and health. Sonaiya and Swan (2004) reported that chickens fed with chemicals and drugs have poorer therapeutic value. In addition, people think that local chickens are natural, nourishing, tasty, and contain no chemical products (Djondo, 2001; Laroche Dupraz *et al.*, 2008). Thus, consumers offer a higher price premium for indigenous birds' meat because: (i) the village poultry's meat is considered to be tastier than commercial hybrid birds (derived from imported stock); and (ii) the birds are not fed with compounded feed, which may contain antibiotics, anti-mould compounds, enzymes and other medicines or synthetic chemicals (Sonaiya and Swan, 2004).

Further, the consumers' preference for indigenous poultry is also due to the consideration of bicycle poultry as having a vital role in socio-cultural functions for which exotic chickens were not acceptable (Emuron *et al.*, 2010). The use of indigenous poultry for ritual is common in many countries of Africa and Asia. For example, in the Northern Thailand, Masuno (2008) found that poultry consumption for rituals accounts for 88.9% of total chicken consumption. In the use of poultry for ritual purposes, the plumage color plays a significant role. This is corroborated by the positive effect of the plumage color on the poultry price obtained in this study. Results show that the 'white color of the plumage' has a significant and positive influence ($p < 0.01$) on chicken price. Price tends to increase by 11% for white chicken, which indicates that buyers were willing to pay about FCFA 166 for a white chicken. This color, however, has negative effect but not significant ($p > 0.10$) on the price of duck and guinea fowl. On the other hand, the black color of the plumage has a significant and negative ($p < 0.01$)

effect on the price of duck whereas this effect is not significant ($p > 0.10$) in guinea fowl.

The positive effect of the white color on the chicken price is related to the religious use of these birds. In fact, chickens are sacrificed during various traditional ceremonies. Chickens that have white plumage are offered in sacrifice to the voodoo god named "Doudoua." The use of this color in traditional ceremonies is perceived as a symbol of peace in Benin (Vidogbena *et al.* 2010). Guinea-fowl with white plumage speckled with black are especially used in sacrifices to the voodoo god "Doukounou" (owner of wealth) in order to ask for good wealth. Ducks with white or ash plumage are preferred for the dowry of women. Chickens with red plumage are destined for the god "Hebiosso" (god of the thunder, owner of rain). Sonaiya and Swan (2004) found similar result in northern Ghana (West Africa) where, in Mamprusi society, a red cock is sacrificed to ask for rain or a good harvest.

Conclusions

Consumers' preference for bicycle poultry is much more a traditional perception of their organoleptic and dietetic qualities, as well as their cultural values. Consumers offer better price for birds of 6 to 12 months age than for younger and older chicken. Consumers also offer a higher price premium for birds with specific color, e.g. the white plumage (used mainly during various traditional ceremonies). Bicycle poultry is also highly appreciated for its taste and the low proportion of fat, and consumers are more interested in meatier birds. Breeding programs intending to improve local chicken breeds should include traits preferred by consumers, notably the weight, the proportion of meat, and the color of the plumage, which would result in higher returns for poultry keepers.

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