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Characterization of turkey (*Meleagris gallopavo*) farming system on Idjwi Island in the Eastern Democratic Republic of the Congo

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ABSTRACT

Objectives : The current study aims at understanding the state of *Meleagris gallopavo* turkey husbandry in Idjwi island, in DRC. It stands as a preliminary study that contributes to the improvement of turkey production by focusing on breeding management in terms of feeding, housing, reproduction and disease management.

*Methodology and Results***:** A survey of 150 turkey farming households in Idjwi Island, was conducted to collect data related to farming techniques and main constraints. Results revealed that majority of farmers are involved in agriculture (67.07%), including turkey farming (18.90%) characterized by free-range system (52.44%), resulting in uncontrolled reproduction (99.39%). Turkeys lay 10.4±1.4 eggs/cycle and regardless of sex poults are mature at a year old. However, deparasitation (92.68%) and hemp based-phytotherapy are commonly used to mitigate disease risks and Newcastle remains the main disease of turkey (70.12%). Health issues are still standing as the main constraint faced by farmers (44.51%).

*Conclusion and application of results***:** Turkey farming system in Idjwi island relies on outdated methods with indigenous breeds, leading to low production. Our study highlights the importance of improving the rearing conditions of indigenous turkeys due to their hardiness and adaptation, in order to achieve production potential while preserving biodiversity. Understanding the breeders'

profile and husbandry management technique, including feeding, housing, reproduction, health care and constraints, would help to improve turkey production and welfare.
Keywords: Husbandry System, Turkeys, Constraints, South Kivu

RESUME

Objectifs: La présente étude visait à caractériser l'état de l'élevage des dindes dans l'île d'Idjwi, en RDC. Il s'agit d'une étude préliminaire qui contribue à l'amélioration de la production des dindes en se focalisant sur la gestion de l'élevage en termes d'alimentation, de logement, de reproduction et de gestion des maladies.

Méthodologie et Résultats: Une enquête a été menée auprès de 150 ménages éleveurs de dindes sur l'île d'Idjwi afin de receuillir les informations sur les techniques d'élevage et les principals contraintes. Les résultats ont révélé que la majorité des agriculteurs est impliquée dans l'agriculture (67,07%) incluant l'élevage des dindes (18,90%) caractérisé par un système d'élevage en divagation (52,44%), ce qui entraine une reproduction incontrôlée (99,39%). Les dindes pondent 10,4±1,4 oeufs/cycle et quel que soit leur sexe, les dindonneaux sont matures à l'âge d'un an. Cependant, le déparasitage (92;68%) et la phytothérapie à base de chanvre sont couramment utilisés pour réduire le risque des maladies et le Newcastle reste la principale maladie de la dinde (70,12%). Ainsi, les problèmes de santé demeurent les principales contraintes auxquelles font face les éleveurs (44,1%).

Conclusion et Application des résultats: Le système d'élevage des dindes dans l'île d'Idjwi repose sur des méthodes archaïques avec des races indigènes, ce qui conduit à une faible production. Nos résultats soulignent l'importance de l'amélioration des conditions d'élevage des dindes de race indigène en raison de leur rusticité et adaptation afin d'atteindre des productions potentielles tout en préservant la biodiversité. La compréhension du profil des éleveurs et des techniques de gestion de l'élevage, y compris l'alimentation, le logement, la reproduction, les soins de santé et les contraintes, permettrait d'améliorer la production et le bien-être des dindes.
Mots-clés : Système d'élevage, Dinde, Contraintes, Sud-Kivu

INTRODUCTION

Since the growth of agriculture, poultry farming has become a key sector in human nutrition. It contributes to ensuring food and nutritional security by providing eggs, feathers, and white meat (Vaarst et *al*, 2015; Gržinić et *al*, 2023). Globally, estimates by the FAO in 2021 showed that 137.8 million tons of poultry were produced, despite disparities among producing countries (FAO, 2022). According to FAOSTAT, the total poultry production was estimated at 5.6 million tons in 2012, attributed to high consumption of poultry. Projections up to 2030 reveal a higher consumption rate (3.4%/year in developing countries and 2.5% globally) compared to other livestock, with a consumption rate of 1.7% per year by 2030 (FAO, 2007; FAOSTAT, 2012). In the DRC, the annual demographic growth rate of 3.2% is higher than the demand for poultry meat (1.5%) between 2010 (68,000 tons) and 2014 (78,000 tons). The same trend was observed for egg production (estimated at 257 million tons, with a growth rate of 0.5% per year between 2010 and 2013), leading to increased imports to meet the demand (FAOSTAT, 2017; UN Data, 2017). Due to its growth rate and potential, diversifying poultry species in farming would be an opportunity to increase physical access to meat products, making turkey farming particularly relevant. Among poultry species, turkey (*Meleagris gallopavo*) is the second most significant species globally in terms of meat production (USDA, 2021; Craft *et al.,*

2022). Compared to domestic chicken, turkey meat has a higher body weight and, consequently, a higher market value. It also possesses an interesting nutritional profile due to its high protein content and low saturated fat levels (Mozdziak, 2014; Fifamè & Dèdéhou, 2019; Rebozov *et al.,* 2020). Furthermore, turkey meat significantly contributes to food security due to its high biological value (B-vitamins, minerals, amino acids), its role in preventing certain diseases, and its hypoallergenic meat, one of the first meats incorporated into infant food (Baggio *et al.,* 2002; Amirkhanov *et al.,* 2017; Jahan *et al.,* 2018; Lisitsyn *et al.,* 2018; Igenbayev *et al.,* 2019). In the DRC, the livestock sector plays a particularly important role, with poultry being among the raised species. However, research on turkeys are still limited. Nevertheless, the recurring wars in the Eastern part of DRC have hindered the expansion of poultry farming due to systematic looting, with turkeys facing additional constraints such as lack of guidance and investment, poor breeding practices and feeding conditions, inadequate prophylaxis and disease control, inbreeding, and fertility and incubation problems (Okoroafor *et al.,* 2020; Rashid *et al.,* 2023) leading to low turkey's numbers per household. Turkey farming has been reported in other territories of South Kivu, including Idjwi with notably high proportions. A study of guinea pig farmers in Idjwi showed that 19.7% of guinea pig farmers concurrently raise both guinea pigs and turkeys in their herds (Metre *et al.,* 2019). Poultry farming is a rapidly growing sector, with turkeys as the second flagship species contributing significantly to the supply of animal proteins in the form of meat. Turkey farming (*Meleagris gallopavo*) offers numerous advantages to farmers, including production of high-quality meat and eggs, allowing them to diversify their products and improve income. To our knowledge, there is little information on the traditional turkey breeding in the Eastern of DRC. Hence, there is a need for a study to contribute to characterizing turkey farming system in Idjwi territory for the improvement of productivity in the village farming. The aim of this research paper aims to study turkey husbandry practices in two chiefdoms of Idjwi (respectively Ntambuka and Rubenga), focusing on the profile of breeders, understanding breeding techniques (in terms of feeding, housing, reproduction, and health management) and highlighting challenges faced by small-scale producers.

MATERIALS AND METHODS

Study area description: The Idjwi territory is the largest lake island in Africa, located in the Eastern part of the Democratic Republic of the Congo (DRC) in the South Kivu province. It is located in the middle of Lake Kivu, halfway between the cities of Bukavu and Goma. Idjwi represents the largest island in the DRC, covering 680 Km2 (approximately 1/9 of the entire extent of Lake Kivu) (Bailey, 1936 in Habakaramo *et al.,* 2015). It extends between 1°56' and 2°8' West latitude and between 28°56' and 29°5' East longitude. The annual distribution of rainfall is bimodal (season A and B) with an annual average of 1500 mm for rainfall per year and 1700 m of altitude. The climate is characterized by 4 dry months (with long rainy season) and classified as tropical climate AW-type according to the Köppen Geiger classification (Hadley, 2015). Although threatened with extinction, vegetation is naturally shrubby and grassy, interspersed with secondary forests. Soils are ancient, mainly derived from basaltic rocks, highly degraded with low fertility (FAO, 1998 ; Heri-Kazi et Bielders, 2020). Overall, the soils are predominantly sandy in the North and clayey in the South.

Materials: In the current study, turkeys (*Meleagris gallopavo*) owned by farmers were the main material used in this survey. Non-

biological materials included a survey questionnaire previously digitized on Kobocollect and a GPS device for collecting geographical coordinates.

Sampling: The study was carried out in the two chieftaincies of Idjwi Territory, namely Rubenga (is situated in the northern part of Idjwi and called "Idjwi Nord") and Ntambuka (located in southern part and known as "Idjwi Sud"). 75 farmers were surveyed at different sites, making a total of 150 turkey farmers selected based on a single criterion: being active turkey farmers in Idjwi.

Data collection: A participatory survey, coupled with interviews and observations among household turkey farmers in the Idjwi territory was conducted. This resulted in data collection using a survey questionnaire via Kobocollect 2021.2.4. This questionnaire included both closed and open questions covering the following sections: households' socio-economic characteristics and different aspects (breeding system, housing, feeding, reproductive, prophylactic system and constraints) of the turkey farming system.

Data analysis: The collected data were encoded into an Excel spreadsheet prior to analysis. Descriptive statistics consisted mainly of frequencies (for qualitative variables) and means associated with standard deviation (for quantitative variables) generated using R software version 4.3.1.

RESULTS

Socio-economic characterization of turkey farmers in Idjwi territory: Table 1 below presents results on socio-economic characteristics of turkey farmers in the two chiefdoms of Idjwi Territory:

Table 1: Socio-economic profile of turkey breeders in Idjwi

Parameters	Rubenga (%)	Ntambuka (%)	Overall average	p-value
Gender of the respondents				
Female	48.78	36.59	42.68	0.155
Male	51.22	63.41	57.32	
Level of education				
Illiterate	53.66	67.07	60.37	0.209
Primary	26.83	15.85	21.34	
Secondary	15.85	15.85	15.85	
University	3.66	1.22	2.44	
Marital status				
Bachelor	25.61	19.51	22.56	0.148
Married	64.63	76.83	70.73	
Widow (er)	9.76	3.66	6.71	
Household size (n)	7.62 ± 2.67	6.90 ± 2.55	7.26 ± 2.63	0.079
Breeding experience (year)	8.16 ± 5.19	8.07 ± 5.02	8.07 ± 5.02	0.914
Main occupation				
Farmer	64.63	69.51	67.07	0.225
Trader	1.22	1.22	1.22	
Animal breeding	15.85	21.95	18.90	
Civil servant	10.98	6.10	8.54	
Craftsman	7.32	1.22	4.27	
Access to training in breeding				
No	97.56	90.24	93.90	0.134
Yes	2.44	9.76	6.10	
Association membership				

No	86.59	92.68	89.63	0.305
Yes	13.41	7.32	10.37	

The results from table 1 shows that turkey farmers are predominantly men (57.32%), married (70.73%), with no formal education (60.37%). Additionally, these farmers have an average of 8 years of experience in turkey farming and belong to households with an average size of 7 people. For 67.07% of breeders, agriculture is the main activity, followed by domestic animal husbandry. Results also show that the majority of surveyed farmers had never had a formal training (93.90%) and do not belong to any farmer-based organization (89.63%).

Method of turkey farming management in Idjwi territory:

Table 2: Characterization of the turkey breeding system in Idjwi territory

Parameters	**Rubenga (%)**	**Ntambuka (%)**	**Overall average**	**p-value**
Acquisition of herds				
Purchase in a market	60.98	87.80	74.39	<0.001
Gift or donation	13.41	1.22	7.32	
Legacy	25.61	10.98	18.29	
Breeding system				
Free range	48.78	56.10	52.44	0.434
Semi-claustration	51.22	43.90	47.56	
Use of labor				
No	91.46	96.34	93.90	0.327
Yes	8.54	3.66	6.10	
Breeding motivation				
Self-consumption	21.95	40.24	31.10	<0.001
Income	32.93	37.80	35.37	
Income and self-consumption	32.93	2.44	17.68	
Meet other needs	12.20	19.51	15.85	
Turkey breed				
Exotic	1.22	1.22	1.22	0.973
Indigenous	98.78	98.78	98.78	
Herd structure (n)				
Turkeys laying eggs	1.83 ±1.06	1.80 ± 1.50	1.81±1.30	0.918
Turkeys with poults	1.92 ±0.90	1.52±0.62	1.75±0.81	0.028
Turkey poults	6.09 ±4.06	9.87±4.49	7.58±4.60	<0.001
Number of females	4.12 ±1.77	5.37±2.76	4.74±2.39	<0.001
Number of males	3.22 ±1.35	5.20±2.24	4.23±2.10	<0.001
Total number of turkeys	10.60±5.33	14.18±6.82	12.39±6.36	<0.001
Other types of animals raised with turkeys (n)				
Duck	2.00 ± 0.76	1.25 ± 0.50	1.75 ± 0.75	0.105
Chicken	3.58 ± 2.21	3.22 ± 2.14	3.43 ± 2.17	0.431
Guinea fowl	1.38 ± 0.52	2.40 ± 3.13	1.77 ± 1.92	0.372
Goat	3.13 ± 1.62	2.86 ± 2.84	3.01 ± 2.25	0.556
Sheep	1.67 ± 0.71	2.33 ± 2.80	1.93 ± 1.79	0.500
Cow	3.67 ± 6.89	1.27 ± 0.47	2.35 ± 4.65	0.262
Turkeys eggs destination				

Self-consumption	45.12	25.61	35.36	
Sales	54.88	74.39	64.64	< 0.001
Use of manure				
Organic fertilizer	67.07	68.29	67.68	0.960
Manure not used	32.93	31.71	32.32	

Results from table 2 are related to type and acquisition of animals, breeding system, flock structure and size, products destination. It is observed that turkeys were acquired through purchase (74.39%) and raised in free-range systems (52.44%) without using hired labor (93.90%). Indigenous breeds predominate due to their hardiness and adaptation to environmental conditions, with an average flock size of 12.36 turkeys per farmer, predominantly consisting of turkey poults (7.48 heads) weaned at 4 months. In addition to turkeys, farmers rear also other poultry (chickens, ducks, and guinea fowl) and ruminants (goats, cattle, and sheep). In terms of animal production, turkeys are generally raised for meat or egg production. These eggs are produced for sale to consumers (61.59%) than for self-consumption (35.39%). Manure produced by turkeys is commonly utilized as organic fertilizer (67.68%).

Turkey housing system:

Table 3: Characterization of turkey housing in Idjwi territory

Parameters	**Rubenga (%)**	**Ntambuka (%)**	**Overall average**	**p-value**
Construction equipment				
Bricks	43.90	42.68	43.29	0.998
Wooden boards	56.10	57.32	56.71	
Types of floor				
Concrete	29.27	51.22	40.24	0.013
Cemented	12.20	10.98	11.59	
Clay/Dirt	58.54	37.80	48.17	
Disinfection				
No	12.20	28.05	20.12	0.019
Yes	87.80	71.95	79.88	
Product types				
None	8.54	25.61	17.07	0.004
Others	6.10	3.66	4.88	
Ash	85.37	70.73	78.05	
Disinfection moment				
Morning	87.80	62.20	75.00	<0.001
Morning and evening	8.54	10.98	9.76	
Evening	3.66	3.66	3.66	
None	0.00	23.17	11.59	
Disinfection frequency (per week)				
Once	35.37	14.63	25.00	0.011
Twice	24.39	26.83	25.61	
Three times	25.61	28.05	26.83	
More than 3 times	6.10	7.32	6.71	
None	8.54	23.17	15.85	

In Idjwi, turkeys are raised in traditional wooden housing with the clay floor (48.17%) disinfected twice to three times a week by spreading ash (78.05%) in the morning (75%). However, higher proportions were observed in Rubenga compared to Ntambuka, indicating that, in general, housing and disinfection parameters are significantly higher for Rubenga compared to those in Ntambuka, except for construction materials.

Turkey feeding system in farming at Idjwi: In poultry farming, nutrition is a crucial aspect influencing animal performance, particularly in birds such as turkeys. Turkeys are fed in basin and plate feeders (respectively 31.10% and 29.88%), with a mainly cereal-based diet (32.32%) distributed twice a day (67.92%). Feed is generally provided without a feeding record (96.95%), and consequently, the daily feed intake is not based on physiological stages or supplementation.

Table 4: Characterization of the turkey feeding system

Parameters	Rubenga (%)	Ntambuka (%)	Overall average	p-value
Presence of feeders				
No	17.07	19.51	18.29	0.839
Yes	82.93	80.49	81.71	
Type of feeders				
Plate	30.49	29.27	29.88	0.627
Basin	28.05	34.15	31.10	
Plastic feeder	18.29	17.07	17.68	
None	15.85	18.29	17.07	
Others	7.32	1.22	4.27	
Presence of drinkers				
Yes	25.61	15.85	20.73	0.177
No	74.39	84.15	79.27	
Type of drinkers				
Basins or seal	39.02	30.49	34.76	0.325
Piece of can	60.98	69.51	65.24	
Feed ration composition				
Kitchen residue	25.61	30.49	28.05	0.692
Pasture	39.02	32.93	35.98	
Cereals	32.93	31.71	32.32	
Oilseeds	2.44	4.88	3.66	
Feeding frequency				
Once	31.25	22.78	27.04	
Twice	65.00	70.89	67.92	0.410
Three times	3.75	6.33	5.03	
Feeding record				
No	98.78	95.12	96.95	
Yes	1.22	4.88	3.05	0.363

Turkey reproduction system:

Table 5: Characterization of the reproductive system

Parameters	Rubenga (%)	Ntambuka (%)	Overall average	p-value
Male broodstock origin				
Purchased at the market	24.4	23.2	23.8	0.713
Purchased from other breeders	14.6	20.7	17.7	
Unknown	36.6	30.5	33.5	
Reproduced on its own farm	24.4	25.6	25.0	
Reproduction mode				
Uncontrolled	100.0	98.78	99.39	0.897
Controlled	0.00	1.22	0.61	
Breeding selection				
No	39.02	35.37	37.20	0.746
Yes	60.98	64.63	62.80	
Selection criteria				
Age	19.51	24.39	21.95	0.064
Body conformation	21.95	34.15	28.05	
Rusticity	19.51	20.73	20.12	
None	39.02	20.73	29.88	
Non-breeding destination				
Slaughter	67.07	78.05	72.56	0.027
Sale	14.63	17.07	15.85	
Sale and slaughter	18.29	4.88	11.59	
Breeding (n)				
Number of eggs per cycle	10.6 ± 1.3	10.2±1.4	10.4±1.4	0.070
Eggs hatched per cycle	9.6 ± 1.1	9.4±1.2	9.5±1.1	0.167
Brooding duration	28.7 ± 0.9	28.8±1.0	28.8±0.9	0.517
Reproductive cycle	9.3 ± 1.7	9.3±1.4	9.3 ±1.6	0.924
Pre-weaning period	3.3 ± 0.5	5.0±1.0	4.2±1.1	<0.001
Age of male maturity (months)	17.7 ± 0.6	8.5±3.1	13.2±5.1	<0.001
Age of female maturity (months)	17.1 ± 0.8	7.5±3.1	12.4±5.3	<0.001

Generally, male breeders used in breeding system have different origins, including purchase from the market (23.8%) or from other farmers (17.7%), breeders from the farm itself (25%), and the vast majority of farmers do not know their origins (33.5%). Consequently, this leads to uncontrolled reproduction (99.39%) because no selection criteria (29.88%) considered. However, for farmers who control reproduction, they select turkey breeders (62.80%) based on either body conformation (28.05%), hardiness (20.12%), or age (21.95%). Furthermore, non-breeding animals are largely slaughtered (72.56%). Turkeys have laid an average of 10.4±1.4 eggs per cycle, among which 9.5±1.1 eggs are incubated. According to farmers, the incubation period for turkeys is 28.8±0.9 days, and once hatched, poults spend 4.2±1.1 months with their mother before weaning. Females (12.4±5.3 months) are introduced to reproduction earlier than males (13.2±5.1 months).

Evaluation of prophylactic methods and constraints related to turkey farming: In turkey farming, application of prophylactic measures is widely practiced, with deparasitation being the most commonly used. Generally, cleaning is carried out twice a week (35.98%), and visits to turkey housing is allowed (96.34%). The most prevalent diseases include bronchitis (57.93%) and Newcastle disease (70.12%) mostly occuring in the rainy season. Constraints faced by farmers

significantly depend on sites (p=0.007). In general, poor hygiene conditions and presence of diseases hinder turkey farming in Idjwi. Additionally, issues such as theft and poor feeding practices are also observed.

Table 6: Characterization of sanitary management and constraints of turkey breeding

Parameters	Rubenga (%)	Ntambuka (%)	Overall average	p-value
Prophylaxis practices				
Deparasitation	81.17	83.90	82.54	0.046
Vaccination	13.44	9.78	11.61	
None	5.39	6.32	5.85	
Vaccination				
No	63.41	74.29	68.85	0.873
Yes	36.59	25.71	31.15	
Deparasitation				
No	14.63	19.51	17.07	0.534
Yes	85.37	80.49	82.93	
Turkey housing cleaning				
No	0.00	1.22	0.61	0.928
Yes	100.00	98.78	99.39	
Cleaning frequency (per week)				
Once	32.93	31.71	32.32	0.982
Twice	35.37	36.59	35.98	
More than three times	31.71	31.71	31.71	
Visitors access				
No	5.71	3.66	4.68	0.839
Yes	94.29	96.34	95.32	
Presence of bronchitis				
No	36.59	47.56	42.07	0.206
Yes	63.41	52.44	57.93	
Medicines against Bronchitis				
Bidens pilosa	1.83	2.22	2.03	0.674
Paracetamol	35.09	29.27	32.18	
Others pharmaceuticals products	12.70	8.54	10.62	
Tetracycline	12.58	11.20	11.89	
None	37.80	48.77	43.28	
Presence of Newcastle				
No	29.27	30.49	29.88	0.841
Yes	70.73	69.51	70.12	
Phytotherapy				
Aloe vera	10.98	12.20	11.59	0.841
Bidens pilosa	13.41	13.41	13.41	
Cannabis sp.	15.85	12.20	14.02	
Ageratum conyzoides	2.44	4.88	3.66	
Nothing	57.32	57.32	57.32	
Breeding constraints				
Feeding	25.61	7.32	16.46	0.007
Hygiene and diseases	39.02	50.00	44.51	
Robbery	35.37	42.68	39.02	

DISCUSSION

The significant role played by turkeys in terms of farming and meeting human needs for animal products has been demonstrated in several studies (Md Yousuf Ali *et al.,* 2019; Rashid *et al.,* 2020). In many households, men, as decision-makers, are generally involved in agriculture, including poultry farming. This is influenced by socio-cultural considerations that attribute the primary role to men within their households (Pindé et *al*., 2020). Similar trends have been observed in domestic chickens' breeders in Ethiopia, with high frequencies (over 82% of surveyed farmers) of married men, the majority of whom had no formal education (Markos *et al.,* 2023). Socio-economic determinants of turkey farmers play a crucial role in the study of production systems, as seen in Bangladesh (Mbanasor & Sampson 2004) and Nigeria (Md Yousuf Ali *et al.,* 2019). In Bangladesh, many turkey farmers are also male (87%), but contrary to our findings, they are primarily businessmen (56%), with agriculture (12%) ranking third among their main activities (Rashid *et al.,* 2020). Thus, results obtained from other studies are in agreement with what has been observed in turkey farming in Idjwi territory. Turkey farmers in Bangladesh (Jahan *et al.,* 2018; Rashid *et al.,* 2020), as those in Idjwi, are motivated by the income generated from this activity. Free-range farming is widespread in rural areas due to the adaptability of local turkey breeds, as observed in turkey farming in Idjwi territory (52.44% practice free-range farming). These local breeds are well-adapted to local conditions and facilitate valorization of abandoned natural food resources. This farming method enables poor farmers to raise livestock with minimal human involvement (Rashid *et al.,* 2020), utilizing resilient and hardy animals. In a similar system, it is common to have 200 to 250 adult turkeys on enclosed areas of approximately 0.4 hectares (Jahan *et al.,* 2018). However, the farming system affects turkey farming in finisher phase, many studies founded that an extensive system (outdoor system) could result in higher weight gain than an intensive (indoor) system (Batkowska et *al*., 2015; Safiyu *et al.,* 2019). This indicates that improving turkey farming conditions in Idjwi could be an opportunity to maximize the potential of locally adapted breeds. Due to their adaptation and hardiness, local turkey breeds are generally raised in free-range (Peters *et al.,* 1997), providing them a wide range of feed, including seeds, cereals, forage, and invertebrates (crickets, grasshoppers, insects, worms, snails) (Singh & Sharma, 2012). Turkeys better utilize forage resources due to their ability to digest fibers they contain (Brad *et al.,* 2010). This could reduce the cost of feeding, representing about 66% of poultry production costs (Mbanasor & Sampson, 2004) and 70% in turkey farming; this high level of feeding costs is attributed to the high nutrient requirements of turkeys compared to other poultry (Ahmed *et al.,* 2012; Wood & Willems, 2014). In Idjwi, small-scale farmers raise various poultry, including turkeys, as well as ruminants (goats, cows, and sheep) and non-ruminants (chickens, ducks, and guinea fowls). Within the same flock, there may be a few exotic breed hens (1 hen) mixed with about twenty indigenous breed hens (22.83 hens) structured into: 5.5±3.50 hens and 0.75±0.67 roosters; 5.67±3.52 pullets and 2.51±1.81 young roosters; and 8.41±5.09 chicks. The size of the poultry flock depends on the starting price of chicks, the price of poultry at maturity, financial resources for management, labor, disease control, farm size and operation mode, as well as the farmer's experience (Markos *et al.,* 2023). In village poultry farming, young animals are first introduced in reproduction based on their body conformation, as observed in chickens (Desta & Wakeyo, 2012; Yakubu *et al.,* 2013). This is probably because the market dictates the price of poultry based on live weight, which is directly related to slaughter yield. In addition

to this morphological criterion, a study conducted in Nigeria on turkeys also notes consideration of reproductive capacity (production of more offspring), egg production, and lastly criteria such as cultural considerations and resistance to diseases (Yakubu *et al.,* 2013). This appears to be similar to what some turkey farmers in Idjwi do, basing their decisions on body conformation, age, and hardiness, although the majority of turkey farmers do not use any criteria. In Idjwi, turkey feeding is based on cereals and forage encountered while ranging. Farmers who provide food to turkeys distribute it the basin. These results align with findings by Mugumaarhahama et al (2016) in domestic chickens in South Kivu. The food resources used are of questionable quality due to farmers' lack of knowledge about dietary requirements and the absence of firms producing turkey feed, making large-scale farming difficult. As a result, small turkey producers prevail (Ojewola *et al.,* 2002; Okoroafor *et al.,* 2020). Several diseases can emerge in poultry farming, causing adverse consequences to animals. Md Yousuf Ali et al (2019) found on the field that common diseases faced by turkey farmers in Bangladesh include Newcastle disease, Gumboro, coccidiosis, salmonellosis, avian influenza, and colibacillosis. Compared to other poultry, turkeys are genetically known to be resistant to certain diseases such as infectious bronchitis, Marek's disease, making vaccination against other diseases such as Newcastle disease, avian cholera, and avian pox necessary (Ahmed *et al.,* 2012). In South Kivu, Newcastle disease is reported in over 98.7% of poultry farms with phytotherapy-based control based on *Cannabis* sp. in two agro-ecological zones (Mugumaarhahama *et al.,* 2016). Among diseases mentioned above, turkey farmers in Idjwi report occurrence of Newcastle disease in their flocks and use the same treatment as for domestic chickens. This could be explained by the fact that turkey farmers gather information from those who raise other poultry, particularly chickens, and use the same traditional knowledge. This approach may lead to disease outbreaks if measures such as veterinary monitoring, disease prevention, and treatment are not taken.

CONCLUSION AND APPLICATION OF RESULTS

The study focused on the opportunities offered by turkey production system in South-Kivu in general and particularly in Idjwi territory. A participatory survey was conducted in Rubenga and Ntambuka among 150 breeder households using a questionnaire previously digitized on Kobocollect. Results revealed that turkey farmers in Idjwi are predominantly married men primarily engaged in agriculture, specifically turkey farming with local breed turkeys raised in free-range conditions characterized by uncontrolled and anarchic reproduction, feeding system based on locally available ingredients. Prevention relies on disinfection and hemp-based phytotherapy against Newcastle disease and bronchitis. These findings indicate that improving turkey farming conditions in Idjwi could maximize the potential of indigenous breeds, due to their hardiness and adaptation to the environment.

For the promotion of turkey farming, further studies on genetic improvement and disease risk factors should be conducted to increase production levels for better profitability among small-scale farmers.

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