



Characterization of poultry production systems and practices related to veterinary antimicrobial use in Fada N’Gourma, Eastern Burkina Faso

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ABSTRACT

Objectives: This study characterized poultry production systems and assessed veterinary antimicrobial use practices in Fada N’Gourma, Eastern Burkina Faso, with particular emphasis on biosecurity, disease management and practices potentially associated with antimicrobial resistance.

Methodology and Results: A cross-sectional survey was conducted from July to September 2024 among 20 small-scale poultry farmers as well as 20 animal production and health professionals. Data were collected using a structured questionnaire and subjected to descriptive analysis. Exotic chickens were the predominant poultry species (42.1%), while digestive and respiratory diseases were the most frequently reported health problems. The implementation of biosecurity measures was inadequate: only 10.87% of farms had footbaths, and 32.61% complied with the recommended stocking densities. Antimicrobials were widely used, mainly for disease prevention, and 70% of farmers reported not respecting the recommended withdrawal periods.

Conclusions and application of results: Poultry production in Fada N’Gourma is constrained by inadequate biosecurity and inappropriate antimicrobial use, which may increase the risk of antimicrobial resistance and antimicrobial residues in poultry products. Le renforcement de la formation des éleveurs et de l’encadrement vétérinaire, la promotion d’un usage prudent des antimicrobiens et l’amélioration du respect des délais d’attente pourraient contribuer à une meilleure santé des volailles et à une meilleure sécurité sanitaire des aliments. Consolidating veterinary drug regulation within a One Health framework could support sustainable poultry production and help preserve antimicrobial effectiveness.

Keywords: Poultry production; antimicrobial use; biosecurity; antimicrobial resistance; veterinary drugs; Burkina Faso.

INTRODUCTION

Poultry production is one of the fastest-growing livestock subsectors worldwide and contributes substantially to food security, poverty reduction and economic development, particularly in low- and middle-income countries. Poultry meat and eggs are affordable sources of high-quality animal protein and provide income to millions of rural and peri-urban households (FAO, 2023). In sub-Saharan Africa, rapid population growth, urbanization and changing dietary habits have contributed to the expansion of commercial and semi-intensive poultry production systems (FAO, 2023; WOA, 2024). In Burkina Faso, poultry farming is an important component of the livestock sector, contributing to household nutrition, income generation and employment, particularly for women and young people. Although traditional production systems remain predominant, semi-intensive and intensive poultry farming have expanded considerably in response to increasing demand for poultry products (MRAH, 2022; Dione *et al.*, 2025). However, poultry productivity continues to remain constrained by infectious diseases, inadequate husbandry practices, weak biosecurity measures and limited access to veterinary services. Diseases such as Newcastle disease, coccidiosis, salmonellosis, colibacillosis and chronic respiratory disease remain important causes of economic losses in poultry production through increased mortality, reduced productivity and higher production costs (Bada-Alambéji *et al.*, 2004 ; Sawadogo *et al.*, 2023). Consequently, veterinary antimicrobials are widely used for disease prevention and treatment of poultry diseases. While these drugs are essential for maintaining animal health, their inappropriate use including empirical treatments, preventive mass medication, incorrect dosing, premature treatment discontinuation and failure to respect withdrawal periods, are a major concern because they may contribute to the emergence of antimicrobial resistance (AMR) and the

occurrence of antimicrobial residues in foods of animal origin (O'Neill, 2016 ; WHO, 2022 ; Viegas *et al.*, 2023). Antimicrobial resistance is now recognized as a major global public health threat . In response, international organizations have promoted the One Health approach, which emphasizes coordinated actions across the human, animal and environmental health sectors to ensure the prudent use of antimicrobials (WHO, 2022 ; WOA, 2024). Burkina Faso has adopted a National Action Plan on Antimicrobial Resistance aligned with the Global Action Plan on AMR. However, the implementation of effective antimicrobial stewardship remains challenging because information on antimicrobial use practices and farm-level biosecurity remains limited , particularly in emerging poultry production areas. Although several studies in Africa have reported inappropriate antimicrobial use in association with inadequate biosecurity and limited veterinary supervision (Bada-Alambéji *et al.*, 2004 ; Caudell *et al.*, 2020 ; Sawadogo *et al.*, 2023), limited information is available on poultry production systems and veterinary drug use practices in eastern Burkina Faso, particularly in Fada N'Gourma, where poultry production has expanded rapidly in recent years. Generating such information is important for improving disease prevention, promoting responsible antimicrobial use and supporting sustainable poultry production. Therefore, this study aimed to characterize poultry production systems and assess veterinary antimicrobial use practices in Fada N'Gourma. Specifically, it sought to describe poultry production systems, identify the major diseases affecting poultry, assess farm biosecurity practices, document antimicrobial use patterns among poultry farmers and animal health professionals, and identify practices that may contribute to antimicrobial resistance and the occurrence of antimicrobial residues in poultry products.. The findings are expected to

provide evidence to inform interventions aimed at strengthening antimicrobial

stewardship and improving poultry production within a One Health framework.

MATERIALS AND METHODS

Study area: The study was conducted in Fada N’Gourma, Gourma Province, eastern Burkina Faso, an important poultry production area located approximately 220 km east of Ouagadougou. The commune belongs to the Sudano-Sahelian agroecological zone and is characterized by a rainy season from May to September and a dry season from October to April. Agriculture and livestock production constitute the principal economic activities, while poultry farming representing one of the fastest-growing livestock enterprises in the region.

Study design and population: A cross-sectional descriptive survey was conducted from July to September 2024 using a One Health approach to characterize poultry production systems and veterinary antimicrobial use practices. The study involved poultry farmers operating commercial or semi-commercial farms and animal health professionals providing poultry health services in Fada N’Gourma. A total of 40 respondents participated in the study, including 20 poultry farmers and 20 animal health professionals. Because no complete sampling frame of poultry farms was available, participants were selected using a convenience sampling based on their availability and willingness to participate.

Questionnaire development and data collection: Two structured questionnaires were developed based on a review of previous studies on antimicrobial use in livestock production (Bada-Alamedji *et al.*, 2006 ; WHO, 2022 ; Sawadogo *et al.*, 2023). One questionnaire targeted poultry farmers, while the other targeted animal health professionals. Both questionnaires were pre-tested on five respondents who were not included in the final study sample, and minor modifications were made before field implementation. Face-to-

face interviews were conducted during visits to poultry farms, veterinary clinics, and veterinary pharmacies. Information collected from poultry farmers included socio-demographic characteristics, poultry species raised, production objectives, biosecurity practices, disease occurrence, veterinary drug use and compliance with withdrawal periods. Data collected from animal health professionals included poultry species commonly treated, major diseases encountered, antimicrobial prescription practices, treatment failures and knowledge of withdrawal periods. Direct observations were also conducted whenever possible to verify selected biosecurity measures, including stocking density, floor type and availability of footbaths.

The main variables investigated were:

- Poultry production characteristics: production system, flock composition, housing characteristics and production purpose;
- Biosecurity practices: stocking density, floor type and footbath availability;
- Poultry health: diseases encountered and treatment strategies;
- Antimicrobial use: antimicrobial classes used, therapeutic and prophylactic indications, treatment duration, route of administration , source of prescription, management of treatment failure and withdrawal-period compliance.

Data analysis and quality assurance: Completed questionnaires were checked daily for completeness before data entry. Data was entered into Microsoft Excel® 2019 for data cleaning, coding and descriptive statistical analysis. Categorical variables were expressed as frequencies and percentages, whereas quantitative variables were summarized using means and ranges when appropriate. Results were presented in tables.

To ensure data quality, investigators received prior training in questionnaire administration. Completed questionnaires were reviewed

daily, and the database was double-checked to minimize transcription errors.

RESULTS

Socio-demographic characteristics of respondents: The socio-demographic characteristics of poultry farmers are presented in Table 1. Most respondents were male (80%) and over aged 35 years (75%). Poultry farming

was mainly practiced as a secondary occupation (90%). Although 60% of farmers had received poultry production training, only 12.5% had been trained in the prudent use of veterinary medicines.

Table 1: Socio-demographic characteristics of poultry farmers (n = 20)

Variable	Category	Frequency	Percentage (%)
Sex	Male	16	80
	Female	4	20
Age	<35 years	5	25
	>35 years	15	75
Education level	No formal education	6	30
	Primary	5	25
	Secondary	5	25
	University	4	20
Poultry training	Yes	12	60
	No	8	40
Training on veterinary drug use	Yes	3	15
	No	17	85
Main occupation	Poultry farming	2	10
	Other activities	18	90

Characteristics of poultry production systems : The poultry species raised by the surveyed farmers are presented in Table 2. Exotic chickens were the predominant poultry

species (42.10%), followed by local chickens (23.68%). Turkeys, guinea fowls and quails were also reared, reflecting the diversity of poultry production systems in the study area.

Table 2: Poultry species raised in surveyed farms

Poultry species	Percentage (%)
Exotic chickens	42.10
Local chickens	23.68
Turkeys	13.15
Guinea fowls	7.89
Quails	7.89
Others	5.26

Biosecurity practices: The implementation of selected biosecurity measures is summarized in Table 3. Only 32.61% of poultry flocks were

kept at the recommended stocking density, 50% were housed on concrete floors and only 10.87% had access to a footbath.

Table 3: Biosecurity practices implemented in surveyed poultry farms (46 poultry flocks)

Biosecurity indicator	Category	Number of flocks (n)	Percentage (%)
Stocking density	Recommended density respected	15	32.61
	Recommended density not respected	31	67.39
Floor type	Concrete floor	23	50.00
	Non-concrete floor	23	50.00
Footbath availability	Footbath available	5	10.87
	No footbath	41	89.13

Major poultry diseases reported by animal health professionals: The main poultry diseases reported by animal health professionals are presented in Table 4. Digestive and respiratory diseases were the

most frequently reported syndromes across all poultry species, whereas nervous, locomotor and nutritional disorders were less commonly reported.

Table 4: Distribution of the main disease syndromes across in different poultry species (%)

Poultry species	Digestive	Respiratory	Nervous	Locomotor	Nutritional
Local chickens	27.13	23.74	15.33	15.25	18.55
Exotic chickens	28.48	27.74	12.69	14.28	17.46
Turkeys	28.77	27.50	13.75	11.25	18.75
Guinea fowls	26.85	26.32	15.52	16.05	15.26
Quails	23.08	23.08	17.39	17.69	18.76

Veterinary antimicrobial use practices : The use of veterinary antimicrobials, treatment administration practices and sources of prescription are summarized in Table 5. Antibiotics were the most frequently used veterinary medicines (70%), and all surveyed poultry farmers reported using antimicrobials. Preventive use (46.94%) was more common

than therapeutic use (38.23%). All antimicrobial treatments were administered via drinking water. Half of the farmers obtained prescriptions from veterinary professionals, whereas self-prescription remained common (35%). In most cases (76.19%), antimicrobial treatments were administered by the farmers themselves.

Table 5: Veterinary antimicrobial use and administration practices among poultry farmers

Variable	Category	Percentage (%)
Veterinary medicines used	Antibiotics	70.00
	Antiparasitic drugs	25.00
	Vitamins	5.00
Farms using antibiotics	Yes	100.00
Purpose of antimicrobial use	Therapeutic	38.23
	Preventive	46.94
	Anti-stress	14.83
Birds receiving treatment	Sick birds	56.00
	Healthy birds (preventive treatment)	44.00
Route of administration	Drinking water	100.00

Treatment duration	3 days	55.00
	5 days	45.00
Source of prescription	Veterinary professional	50.00
	Self-prescription	35.00
	Advice from relatives	15.00
Person administering treatment	Farmer	76.19
	Veterinarian	14.28
	Poultry attendant	9.52

Management of antimicrobial treatments and compliance with withdrawal periods:

The perceptions Farmers' perceptions of antimicrobial treatment effectiveness, responses to treatment failure and compliance with withdrawal periods are presented in Table 6. More than half of the respondents (55%) considered antimicrobial treatments effective, whereas 25% reported partial effectiveness and 20% perceived them as ineffective. In the event

of treatment failure, most farmers changed the antimicrobial molecule (63.15%), while others increased the dosage (36.85%). In addition, 72.22% of farmers discontinued treatment once clinical signs disappeared, and only 30% respected the recommended withdrawal periods. Veterinary professionals were the main source of dosage recommendations (57.14%).

Table 6: Management of antimicrobial treatments and compliance with withdrawal periods

Variable	Category	Percentage (%)
Perceived effectiveness of antimicrobial treatment	Effective	55.00
	Partially effective	25.00
	Ineffective	20.00
Action following treatment failure	Change antimicrobial molecule	63.15
	Increase dosage	36.85
Treatment completion	Discontinued after clinical improvement	72.22
	Completed as recommended	27.78
Withdrawal period	Respected	30.00
	Not respected	70.00
Source of dosage recommendation	Veterinary professional	57.14
	Package insert	23.80
	Personal experience	19.04

DISCUSSION

Socio-demographic characteristics of poultry farmers: The study showed that poultry farming in Fada N’Gourma was predominantly practiced as a secondary economic activity, indicating that it mainly complements household income rather than serving as the primary livelihood. Similar observations have been reported in Burkina

Faso, Benin and Cameroon, where poultry production is integrated into mixed crop-livestock farming systems (Keambou *et al.*, 2016 ; Adoligbe *et al.*, 2020 ; Dione *et al.*, 2025). Although most respondents had received training in poultry production, only a few had received training in the prudent use of veterinary medicines. Comparable knowledge

gaps have been reported in Tanzania, Ghana and Uganda (Boamah *et al.*, 2016 ; Caudell *et al.*, 2020 ; Samuel *et al.*, 2023), highlighting the need to strengthen farmer training in antimicrobial stewardship.

Poultry production systems, biosecurity and disease occurrence: The predominance of exotic chickens may reflect the ongoing intensification of poultry production in response to increasing market demand, a trend also reported in other West African countries (Adoligbe *et al.*, 2020 ; Bamidele *et al.*, 2020). However, the low availability of footbaths, poor compliance with recommended stocking densities and the limited use of concrete floors indicate inadequate implementation of selected biosecurity measures. Similar shortcomings have been described in Ethiopia, Ghana and Kenya, where weak biosecurity has been associated with disease transmission and increased antimicrobial use (Sambo *et al.*, 2015 ; Boamah *et al.*, 2016 ; Kiambi *et al.*, 2021). Digestive and respiratory diseases were the most frequently reported health problems across all poultry species. These findings are consistent with studies conducted in Senegal, Nigeria and Ethiopia, where infectious diseases remain major constraints to poultry productivity (Bada-Alambédji *et al.*, 2004 ; Olatoye and Basiru, 2013 ; Asfaw *et al.*, 2021). Improving farm hygiene and preventive health measures could help reduce disease occurrence and the need for antimicrobial treatments.

Veterinary antimicrobial use practices: All surveyed poultry farmers reported using antimicrobials, indicating their widespread use in poultry disease management. Similar levels of antimicrobial use have been reported in Nigeria, Tanzania and Bangladesh (Oloso *et al.*, 2018 ; Kimera *et al.*, 2020 ; Hassan *et al.*, 2021). The predominance of preventive over therapeutic use is of particular concern because routine prophylactic use may contribute to the emergence of antimicrobial resistance. International organizations recommend

limiting preventive antimicrobial use to situations justified by veterinary risk assessment (WHO, 2022 ; WOA, 2024). All antimicrobial treatments were administered through drinking water, a practice commonly used in intensive poultry production systems because of its simplicity (Hassan *et al.*, 2021). Nevertheless, this route of administration may result in variable drug intake among birds and compromise treatment effectiveness.

Antimicrobial treatment management and withdrawal periods: Only half of the farmers obtained antimicrobial prescriptions from veterinary professionals, while self-prescription remained common. Furthermore, most respondents reported changing the antimicrobial molecules after treatment failure or discontinuing treatment as soon as clinical signs disappeared. Similar practices have been documented in several African countries and are recognized as important drivers of antimicrobial resistance (Caudell *et al.*, 2020 ; Samuel *et al.*, 2023 ; WHO, 2022). Another important finding was the poor compliance with antimicrobial withdrawal periods, with only 30% of farmers that they respected the recommended waiting period before marketing poultry products. Similar observations have been reported in Cameroon, Ghana and Senegal (Bada-Alambédji *et al.*, 2004 ; Boamah *et al.*, 2016 ; Moffo *et al.*, 2020). Failure to observe withdrawal periods may result in antimicrobial residues in poultry products, representing a potential risk for consumers and potentially contributing to antimicrobial resistance.

Implications for poultry production: Overall, the findings indicate that poultry production in Fada N’Gourma includes increasingly intensive systems but continues to face important challenges related to biosecurity and the prudent use of veterinary antimicrobials. Strengthening farmer training, improving veterinary advisory services, promoting farm biosecurity and reinforcing awareness of withdrawal periods could help

reduce inappropriate antimicrobial use and supporting sustainable poultry production. These recommendations are consistent with the One Health approach promoted by FAO,

WHO and WOAHA to address antimicrobial resistance while improving animal health and food safety (FAO, 2023 ; WHO, 2022 ; WOAHA, 2024).

CONCLUSIONS AND APPLICATION OF RESULTS

This study characterized poultry production systems and veterinary antimicrobial use practices in Fada N’Gourma, eastern Burkina Faso. Poultry production was characterized by the predominance of exotic chickens, diversified rearing systems and poultry farming practiced mainly as a secondary economic activity. Despite the development of the sector, poultry production remains constrained by inadequate biosecurity, particularly the limited use of footbaths and poor compliance with recommended stocking densities, while digestive and respiratory disorders were frequently reported. The study also revealed widespread antimicrobial use, mainly for disease prevention, together with poor compliance with withdrawal periods and limited veterinary involvement in antimicrobial prescribing. These practices may

contribute to increase the risk of antimicrobial resistance and antimicrobial residues in poultry products. The findings of this study provide useful baseline information on poultry production and antimicrobial use practices in Fada N’Gourma. The gaps identified at farm level highlight the need for practical actions. Farmers should receive regular training on basic biosecurity measures, prudent antimicrobial use, correct dosage and treatment duration, as well as compliance with withdrawal periods. Veterinary services should also increase their involvement through regular advisory visits to poultry farms, with particular attention to antimicrobial prescribing and treatment practices. At farm level, simple measures such as the use of footbaths and compliance with recommended stocking densities should be encouraged and routinely.

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