PESTICIDE RESIDUES IN SOME UNCONVENTIONAL FEEDING STUFFS IN KASHERE AND ITS ENVIRONS IN GOMBE STATE, NIGERIA

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ABSTRACT
The presence of pesticide residues in feeding stuffs poses significant health risks to livestock and, consequently, to humans through the food chain. This study was conducted to investigate the levels of pesticide residues in some unconventional feedstuff sourced from Kashere and its environs in Gombe State, Nigeria. Samples of unconventional feedstuff, including crop residues and agro-industrial by-products, were analyzed for pesticide residues using gas chromatography-mass spectrometry (GC-MS). The findings revealed varying levels of pesticide residues with some exceeding the maximum residue limits (MRLs) set by regulatory bodies. Malathion residues were isolated in groundnut haulms at 0.6 mg/kg, which is above the MRL of 0.5 mg/kg. Chlorpyrifos residues were found in cowpea husk at 0.5 mg/kg, exceeding the MRL of 0.1 mg/kg while Cypermethrin residues were detected at 0.3 mg/kg, below the MRL of 0.5 mg/kg. The study highlights the need for better pesticide management practices and regular monitoring to ensure the safety of feedstuff used in livestock production.
Keywords: Pesticides, Residues, Feeding stuffs, Kashere and its environs

INTRODUCTION
The need for food production to meet the world's needs has increased the scrutiny of agricultural practices., with an increasing focus on the quality and safety of animal feedtuff. As the agricultural landscape evolves, unconventional feedstuffs have gained popularity as viable alternatives to traditional sources, driven by factors such as sustainability, availability, and economic feasibility (Devendra, 1988). However, the use of unconventional feedstuffs brings forth new challenges, one of which is the potential contamination with pesticide residues (Nag *et al.,* 2014; FAO/WHO (2021)).
Pesticides play a crucial role in modern agriculture by safeguarding crops against pests and diseases (Singh *et al.*, 2020). Farmer's ignorance of pesticide toxicity leads to misuse such as abusive application (Nguegang *et al*., 2005). The general public and animals are exposed to pesticides through the intake of contaminated foods and unconventional feed resources which are directly used during cropping and storage (Matthews *et al*., 2003 and Gimou *et al*., 2008). There are concerns among livestock farmers that Pesticides residue residues on unconventional feed such as cowpea haulms, cowpea husk and groundnut haulms could negatively affect these animals (Noble, 2017). This study aims to assess the levels of pesticide residues in selected unconventional feedstuff and evaluate their potential implications for animal and human health.

MATERIALS AND METHODS
Study Area
The study was conducted in Kashere and surrounding agricultural areas in Gombe State, Nigeria. These regions are known for their extensive use of pesticides in crop production. located in Gombe State, Nigeria, is characterized by a semi-arid climate typical of the Sudan Savanna ecological zone. The area experiences distinct wet and dry seasons influenced by the movement of the Inter-Tropical Convergence Zone (ITCZ). The wet season spans from May to October, with an average annual rainfall of 800–1000 mm. Rainfall is often intense but erratic, leading to variations in water availability. The area experiences high temperatures throughout the year, ranging from 25°C to 40°C. The hottest months are typically March to May, while December and January are cooler due to the hamatan winds.**Sampling Procedure**
Unconventional crop residues were collected from Kashere, Pindiga and Tumu. Samples were randomly collected during harvest time from individual farms and these include Cowpea haulms, Cowpea husk and Groundnut haulms

Sample Collection and Preparation
A total of 27 Unconventional feedstuff consisting of 9 samples each of cowpea haulms, cowpea husks and groundnut haulms were randomly collected and shed dried for further analysis. Each of the samples was thoroughly ground to a powdered form using an agate pestle and mortar and later transported to Science Laboratory, Kano State Polytechnic for analysis.

Extraction and analyses

The pesticide residue analysis was performed using gas chromatography-mass spectrometry (GC-MS) following standard methods (EPA, 2014). Samples were prepared by solvent extraction and purification using solid-phase extraction (SPE) cartridges as a modified method describe by Sajid (2016). The GC-MS was calibrated with certified pesticide standards, and residue concentrations were expressed in mg/kg according to Mitra (2003).

Statistical Analysis

Statistical analysis was conducted using SPSS (version 26) to determine differences in residue levels among feedstuff types while the residue levels were compared with maximum residue limits (MRLs) established by the Codex Alimentarius Commission (2022).

RESULTS AND DISCUSSION

Pesticide Residue Levels in Some Unconventional Feedstuffs

The result revealed significant pesticide contamination in the analyzed feedstuffs. Groundnut haulms and cowpea husks showed residue levels exceeding maximum residue limits (MRLs), while cowpea haulms had residues within permissible limits. Malathion residues were isolated at 0.6 mg/kg, which is above the MRL of 0.5 mg/kg. This is in agreement with Adeyeye *et al.* (2018), who reported similar malathion levels in leguminous crop residues from Northern Nigeria, reflecting its common use as a post-harvest preservative.

Chlorpyrifos residues were found in cowpea husk at 0.5 mg/kg, exceeding the MRL of 0.1 mg/kg set by the Codex Alimentarius Commission. This is consistent with findings by Ezekiel *et al.* (2012) in Southwestern Nigeria, where chlorpyrifos contamination was reported in cowpea residues due to intensive pesticide application during cultivation.

Cypermethrin residues were isolated in cowpea haulms at 0.3 mg/kg, below the MRL of 0.5 mg/kg. Similar levels were observed by Babayemi *et al.* (2010) and Kabir *et al*. (2020), who found cypermethrin residues in cowpea by-products from controlled pesticide application regions in Nigeria.

Groundnut haulms and cowpea husks exhibited higher contamination levels compared to cowpea haulms. The variation in residue levels could be attributed to differences in pesticide absorption, surface area, and exposure during pre-harvest and post-harvest periods. Residues in groundnut haulms and cowpea husks pose significant risks to livestock health. Chlorpyrifos, detected in cowpea husks, is a potent organophosphate that can cause neurological dysfunction and reduced feed efficiency (Aktar *et al.,* 2009). Similarly, malathion in groundnut haulms has been linked to oxidative stress, potentially impairing liver and kidney functions in livestock (Smith *et al.,* 2018; Owoeye, 2019).

Studies by Mwangi *et al.* (2016) also reported comparable cases of livestock morbidity associated with chlorpyrifos and malathion contamination, emphasizing the need for stricter control measures. Similarly, to the findings in this study, Sajid (2016) reported high pesticide residues in cowpea and groundnut residues and attributed it to inadequate farmer training and poor regulatory enforcement.

CONCLUSION

This study highlighted the prevalence of pesticide residues in groundnut haulms, cowpea husks, and cowpea haulms, which are commonly used as feeding stuffs in Kashere and its environs. The detected residues, particularly chlorpyrifos, malathion, and cypermethrin, revealed varying levels of contamination, with groundnut haulms and cowpea husks exceeding the permissible maximum residue limits (MRLs). The findings underscore the potential health risks to livestock, including reduced productivity and subclinical toxicity, as well as the risk of bioaccumulation and transfer to human consumers through animal products. It is therefore recommended that there should be an improved agricultural practice thereby promoting the adoption of integrated pest management (IPM) and judicious pesticide use among farmers. Authorities concerned should enforce the regulatory monitoring in other to establishing residue monitoring systems to ensure compliance with safety standards. Farmers training should be over emphasized to raise awareness and providing technical knowledge on safe pesticide application and residue mitigation.

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