Content lists available at www.jacsonline.org/D176750082-LROR/ JACSOnline GP, DOI:10.22341

Journal of Applied Chemical Science

Journal homepage: www.jacsonline.org/journals/jacson/

Screening of Pesticide Residues in Beef, Chevon and Internal Organs of Some Selected Goats Slaughtered in Yola Abattoir of Adamawa State, Nigeria

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Article history: Received in revised August 22, 2018 Accepted October 20, 2018 Available online xxxxxxxxxxxxxxx

Cite this article as: *Maitera ON, Jibril A, Yusuf BS, Louis H, Aderemi AT, and Oyebanji OF.* ***Screening of Pesticide Residues in Beef, Chevon and Internal Organs of Some Selected Goats Slaughtered in Yola Abattoir of Adamawa State, Nigeria.*** J Applied Chem. Sci.

DOI: https://dx.doi.org/10.22341/jacs.on.00xxxpxxx **p-ISSN: 2089-6328, e-ISSN: 2580-1953**

ABSTRACTS

In order to avoid the toxic health hazards, it is necessary to determine the level of pesticides in edible tissue like meat, liver, intestine and kidney of common food animal (such as Goat) which are probably reared where pesticides usage in the environment are prevalent. This work examines the presence of pesticides residue levels in beef, chevon, and internal organs obtained from Yola Abattoir in Adamawa State. Organochlorines and organophosphorus were analyzed in the collected meat, chevon and internal organs using Quick, Easy, Cheap, Effective, Rugged and Safe method of extraction with GC-MS techniques. The residue analysis revealed that beef and chevon samples have no traces of organochlorines while, organophosphorus: (anthracene, chlorpyrifos, dichlorvos, dichlorpyrifos, diazinon, dimethoate, primifos-methyl, and malathion) pesticide residue detected were below threshold level of 0.01 mg/kg. The result of the animals' intestine showed the presence of chlorpyrifos (0.034 ± 0.001 vs. 0.031 ± 0.001) and (0.027 ± 0.001 vs.0.023 ± 0.0014) above the standard values, whereas, the dichlorvos level were (0.059 ± 0.0014 vs. 0.050 ± 0.0007), (0.061 ± 0.0007 vs. 0.043 ± 0.0014) and (0.072 ± 0.0014 vs. 0.031 ± 0.001) below the maximum residual value of 1 mg/kg. The kidney residue revealed that dichlorprifos, diazinon, dimethoate, primi-methyl and malathion were below the maximum residue limit (0.001 mg/kg) in the cow samples while chlorpyrifos: (0.013 ± 0.001 vs. 0.012 ± 0.001 vs. 0.018 ± 0.001 vs. 0.053 ± 0.001) above standard value (0.01 mg/kg). Dichlorvos was detected in the kidney; (0.069 ± 0.0007 vs. 0.035 ± 0.0014) and (0.052 ± 0.0014) below the maximum residual limit (MRL). Residue analysis in the livers also showed the presence of chlorpyrifos at (0.011 ± 0.001), (0.014 ± 0.001), (0.08 ± 0.001) above the recommended value while dichlorvos (1.012 ± 0.001 vs. 0.027 ± 0.001) and (0.029 ± 0.001 vs. 0.037 ± 0.001) below MRL established by the international health regulation agencies. Residue analysis of all the samples studied shows no trace of organochlorine pesticides. These findings are alarming and threat to public health.

Keywords: pesticide, maximum residual limit (MRL), organochlorine, organophosphorus

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1. Introduction

Pesticides are substances meant for attracting, seducing, destroying, or mitigating any pest (Akan *et al.*, 2014). Pesticides are used widely to improve agricultural production and also to prevent arthropod-borne diseases. They are a class of biocide and most common use of pesticides is as plant protection products (also known as crop protection products), which in general protect plants from damaging influences such as weeds, plant diseases or insects. This use of pesticides is so common that the term *pesticide* is often treated as synonymous with *plant protection product*, although it is in fact a broader term, as pesticides are also used for non-agricultural purposes. The term pesticide includes all of the following: herbicide, insecticide, insect growth regulator, nematicide, termiticide, molluscicide, piscicide, avicide, rodenticide, predacide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer. In general, a pesticide is a chemical or biological agent (such as a virus, bacterium, antimicrobial, or disinfectant) that deters, incapacitates, kills, or otherwise discourages pests. Target pests can include insects, plant pathogens, weeds, mollusks, birds, mammals, fish, nematodes (roundworms), and microbes that destroy property, cause nuisance, or spread disease, or are disease vectors. Although pesticides have benefits, some also have drawbacks, such as potential toxicity to humans and other desired species in the ecosystem. According to the Stockholm Convention on Persistent Organic Pollutants, 9 of the 12 most

dangerous and persistent organic chemicals are pesticides and are used improperly due to the lack of appropriate knowledge about their implications and untoward effects (Akan et al., 2014). The excessive usage is harmful to ecosystem and they contaminate soil, surface and underground water resources (Khodadadi *et al*., 2012; Srivastava *et al*., 2010). Live- stock meat and dairy products are a primary source of human dietary exposure to organochlorine (OC), since between 60 – 85% of the mean daily intake arose from these particular food classes (Jadhav and Waskar, 2011). Pesticides along with certain environmental chemicals are known to cause endocrine disruption by mimicking or antagonizing natural hormones in body and it has been postulated that their long-term, low-dose exposure are increasingly linked to human health effects such as immunosuppression, hormone disruption, diminished intelligence, reproductive abnormalities and cancer (Jadhav and Waskar, 2011; Hurley *et al*., 1998). Before 2000 BC, humans have utilized pesticides to protect their crops. The first known pesticide was elemental sulfur dust used in ancient whiles about 4,500 years ago in ancient Mesopotamia. The Rig Veda, which is about 4,000 years old, mentions the use of poisonous plants for pest control (US Agency, 2007). By the 15th century, toxic chemicals such as arsenic, mercury, and lead were being applied to crops to kill pests. In the 17th century, nicotine sulfate was extracted from tobacco leaves for use as an insecticide. The 19th century saw the introduction of two more natural pesticides, pyrethrum, which is derived from chrysanthemums, and rotenone from the roots of tropical vegetables (Rao *et al*., 2007). Until the 1950s, arsenic-based pesticides were dominant (Miller, 2000).

Paul Müller discovered that DDT was a very effective insecticide. Organochlorines such as DDT were dominant, but they were replaced in the U.S. by organophosphates and carbamates by 1975. Since then, pyrethrin compounds have become the dominant insecticide (Miller, 2000). Herbicides became common in the 1960s, led by "triazine and other nitrogen-based compounds, carboxylic acids such as 2,4-dichlorophenoxyacetic acid, and glyphosate" (Jadhav and Waskar, 2011). The first legislation providing federal authority for regulating pesticides was enacted in 1910 (Hurley et al., 1998). However, decades later during the 1940s manufacturers began to produce large amounts of synthetic pesticides and their use became widespread. Some sources consider the 1940s and 1950s to have been the start of the "pesticide era''.

Although the U.S. Environmental Protection Agency EPA was established in 1970 and amendments to the pesticide law in 1972, pesticide use has increased 50-fold since 1950 and 2.3 million tones (2.5 million short tons) of industrial pesticides are now used each year. Seventy-five percent of all pesticides in the world are used in developed countries, but the usage in developing countries is increasing (Ritter, 2009). In 2001 the EPA stopped reporting yearly pesticide use statistics. A study of USA pesticide use trends through 1997 was published in 2003 by the National Science Foundation's Center for Integrated Pest Management (Goldmann, 2007). In the 1960s, it was discovered that DDT was preventing many fish-eating birds from reproducing, which was a serious threat to biodiversity. Rachel Carson wrote the best-selling book *Silent Spring* about biological magnification (Gazzotti *et al*., 2008; Kasyap and Gupta, 1973). The agricultural use of DDT is now banned under the Stockholm Convention on Persistent Organic Pollutants, but it is still used in some developing nations to prevent malaria and other tropical diseases by spraying on interior walls to kill or repel mosquitoes.

The indiscriminate or proliferation and usage of pesticide in agriculture, domestic, veterinary and institutions has brought about the increase consumption or their intake in crops and meat consumed. This has increased over the years in Nigeria to about several thousand folds from 30 metric ton (MT) in 1977 to 20,000 MT in 2003 – 2005. To this end, there are some uninvestigated cases of threat to public health constituted by pesticide poisoning from milk, meat and other fat-rich organs of animal: liver, intestine and kidney.

Despite the use of pesticide in agriculture and in residential environment, few studies have measured children exposure levels some have focused on pesticide residual level in agriculture products. There are little or no published studies identified to date that examined pesticide residue of meat products, its prevailing hazards and environmental control policy through continuous supervision and monitoring of these pesticide in water, sediments and the environment in the north east region of Nigeria. These increase in the proliferation and use of pesticide in agriculture produce, residential areas and the predisposing cases of pesticide usage; poisoning and its prevalence health hazard rekindle the quest for this research work.

2. Materials and Methods

2.1. Materials

The equipment and apparatus used for the analysis include the following, acetonitrile, magnesium sulphate and sodium chloride (all pesticide grades) were obtained from reagent trade chemical provider. Other materials include distilled water, polythene zipper bag, electric chopper, and centrifuge.

2.2. Methods

The samples for pesticide analysis were collected from Yola Abattoir in polythene zipper bags/containers. The beef, chevon and internal organs of the animals were collected during early morning working hour. The sample were labeled, parked and transported to the laboratory for pesticide residue analysis.

2.3. Study Area

This research work was carried out at Yola Abattoir in Yola North, Adamawa State, Nigeria. Naturally, this region is abundantly blessed with nomads who are predominantly peasant farmers. However, due to increase need for food as a result of the growing population of the state and for financial gains, the people have accepted mechanized and agrochemical farming.

Fig 1. Map of Adamawa State Showing Yola North (Study Area)

2.4. Sample Collection

The beef and chevon of 10 different goats were collected along with their intestine, kidney and liver. A total of forty (40) samples were collected / purchased within a span of two months (March and April 2015). The samples were packed in polythene bags and transported to the laboratory for analysis.

2.5. Extraction of pesticide residue in meat/ organs

The meat, chevon along with their intestine, kidney and liver samples was collected and labeled as C_1M, C_1I, C_1K, C_1L, C_2M, C_2I, C_2K, C_2L, G_1C, G_1I, G_1K, G_1L, G_2C, G_2I, G_2K and G_2L accordingly. About 10 g of the beef sample was weight chopped and the homogenized ground beef was transferred into a 50-mL centrifuge tube. The sample was extracted using 2 mL water and 10 mL acetonitrile (ACN), followed by vigorous shaken for 1 minute. 4g $MgSO_4$ and 1g of NaCl was also added and vigorously shaken for 1 minute. Thereafter the sample was transferred to the centrifuge for 3 minutes at 4000 rpm where 1 mL aliquot of the supernatant (top layer) was taken for dSPE cleanup, other samples were sequentially treated accordingly.

2.6. dSPE Cleanup

The cleanup was when 1-mL aliquot of supernatant was transferred to a 2-mL dSPE cleanup tube that contains 150 mg of magnesium sulfate, 50 mg PSA sorbent, and 50 mg C_{18} sorbent (p/n 186004830). The content was shaken vigorously for 1 minute and a portion of the supernatant was transferred to the LCMS Certified Vial for GC/MS analysis.

2.7. Analysis

The analysis was carried using 1 mL aliquot of the supernatant which was transferred into a certified vial for gas chromatography-mass spectrometry where the Pesticides (organochlorides and organophosphorus) residue level in samples was determined with GC condition: system – Agilent 7890A Agilent technologist inert MSD 5975CM Column; Agilent J and W GC columns HP-5MS 30(M) 0.250 DIAM (MM) 0.25 film (UM) Temp Limit 60 to 325^oC gas – Helium, flow. The software CSW 32 was used to obtained peak of height and area under curve.

2.8 Statistical Analysis

The analysis of all the animals' samples was carried out using the software CSW 32 for the GCMS instrumentation, the peak height, area under curve and the type of pesticide used were obtained. Statistical Packages for Social Sciences (SPSS) was used to arrive at the mean and standard deviation

3. Results and Discussion

3.1. Result of Pesticide Residue Levels of the Animals Samples

The pesticides: (organochlorines and organophosphorus) residue levels were analyzed in beef, chevon, intestine, kidney and liver of 10 different goats within the span of March and April 2015 as presented in Tables 1 to 10 and some selected GC-MS Spectrometry at the appendices which revealed no organochlorines in beef and chevon samples in all the animals. Organophosphorus residue level, of some selected data from Tables 1 to 10 showed that chlorpyrifos was above the maximum residue limit (MRL) of (0.001 mg/Kg) in virtually some of the animals' intestine; (0.034 ± 0.001), (0.031 ± 0.001) (0.027 ± 0.001), (0.021 ± 0.001) and (0.023 ± 0.0014). Dichlorvos were detected in the kidney of the animals below the MRL value of 1 mg/Kg; (0.059 ± 0.0014), (0.050 ± 0.0007), (0.061 ± 0.0007), (0.043 ± 0.0014), (0.072 ± 0.0014) and (0.031 ± 0.001). Analysis in the livers also showed the presence of chlorpyrifos at (0.011 ± 0.001), (0.014 ± 0.001), (0.08 ± 0.001) above the recommended value while dichlorvos (1.012 ± 0.001), (0.027 ± 0.001), (0.029 ± 0.001) and (0.037 ± 0.001) below MRL established by the international health regulation agencies. Other organophosphorus found below threshold level of 0.001 mg/Kg are anthracene, chlorpyrifos, dichlorvos, dichlorpyrifos, diazinon, dimethoate, primifos-methyl, and malathion. This analysis revealed the preferences of pesticide to the internal organs: intestine, kidney and liver in the animals. The preferences are mostly in the goats than the cows due to the body size and weight of the animals as can be deduced from the exposure of this pesticide in the literatures.

3.2. Results of Pesticide Residues Level of Goat 1 Samples

Table 1. Concentration (mg/kg) of Organophosphorus Pesticide Residues in Goat 1 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.031 ± 0.0007	0.013 ± 0.001	<0.001
Dichlorvos	0.113 ± 0.0014	0.050 ± 0.0007	0.069 ± 0.0014	<0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorine pesticide detected

Table 1 shows Goat I samples and the mean ± S.D values (mg/Kg) of pesticides residue levels which indicated no trace of organochlorine pesticide residues in the goat I samples analyzed. While, organophosphorus pesticides residues, with particular emphasis to chlorpyrifos are detected in the intestine and kidney in the ranged of (0.031 ± 0.0014) and (0.013 ± 0.0007) while, dichlorvos are detected in Chevon (goat meat), intestine and kidney in the following order; (0.0113 ± 0.0014), (0.050 ± 0.0007), and (0.069 ± 0.0014). This indicates that organochlorine pesticides are not possibly use in the environment where these animals are obtained. In case of the organophosphorus pesticides, most of the rural farmers and domestic activities in homes and institutions use insecticides which may be attributed to their presence.

Table 1 indicates the pesticide residues level of chlorpyrifos above the MRL values of 0.01 mg/Kg with the corresponding percentage increase of 310% and 130% in intestine and kidney of goat I samples analyzed. This implies that the samples analyzed are contaminated with chlorpyrifos in line with the MRL values from literature. The concentration of pesticide levels of dichlorvos were significantly below the MRL value of 1.00 mg/Kg, with 1.1%, 5% and 6.9% respectively. These data showed no level of contamination in the samples analyzed.

3.3. Results of Pesticide Residue Levels of Goat 2 Samples

The Table 2 shows Goat 2 samples and the mean ± S.D values (mg/Kg) of pesticide residues analyzed. The values indicated no traces of organochlorine pesticide was detected while, the organophosphates pesticide residues of Anthracene, Dichlorpyrifos, Diazinon, Dimethoate, primifos-methyl, and malathion are below detection limit of (< 0.001 mg/Kg). This indicates that organophosphorus pesticides are not use in the environment for agriculture and domestic activities.

Table 2. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 2 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.023 ± 0.0014	0.018 ± 0.001	0.008 ± 0.0007
Dichlorvos	<0.001	0.043 ± 0.0014	0.035 ± 0.0007	0.028 ± 0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001 No trace of Organochlorine pesticide detected.

However, the fact that the presence of organophosphorus was below the threshold level their effects cannot be over emphasis as the organophosphorus pesticides (OPPs) are widely used to control pests and microorganism in household, public health, stored products and have been shown to have toxic effects in human and animals. OPPs are toxic and usually are not persistent in the environment as the OCPs. The organophosphates affected the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter.

The most frequent occurring pesticides in this study were chlorpyrifos and dichlorvos which also were found in the intestine, kidney and liver of goat II. The mean ± S.D of the pesticides residues are; (0.023 ± 0.0014), (0.018 ± 0.001), (0.013 ± 0.007) of Chlorpyrifos and (0.043 ± 0.0014), (0.035 ± 0.0007) and (0.028 ± 0.001) of Dichlorvos. This shows that the concentrations of the pesticide residues of chlorpyrifos are higher than the MRL values of 0.01 mg/Kg as obtained from the literature with, percentage increase of 130%, 180% and 230% in the samples analyzed. The sample analyzed for Dichlorvos shows, the pesticide residues values to be less than the MRL values of 1.00 mg/Kg with 4.3%, 3.5% and 2.8% less. The data showed that the samples in goat II were contaminated with chlorpyrifos pesticide residue while with dichlorvor, samples are not contaminated on the bases of the MRL values from literature.

3.4. Results of Pesticide Residues Level of Goat 3 Samples

Table 3. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 3 Samples

Pesticide	**Chevon**	**Intestine**	**Kidney**	**Liver**
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.021 ± 0.001	0.012 ± 0.0007	<0.001
Dichlorvos	0.073 ± 0.0014	0.031 ± 0.001	0.052 ± 0.0014	<0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorine pesticide detected

The Table 3 shows Goat III samples and the mean ± S.D values (mg/Kg) of pesticide residues levels analyzed. The values indicated, no traces of organochlorine pesticide were detected while, the organophosphates pesticide residues of Anthracene, Dichlorpyrifos, Diazinon, Dimethoate, Primifos-methyl, and Malathion are below detection limit of (< 0.001 mg/Kg). This indicates that pesticides of this nature are not possibly use in the environment for agriculture and domestic activities. Chlorpyrifos and Dichlorvos are found in the chevon, intestine and kidney of goat III samples. The mean ± S.D of the pesticides residues are; (0.021 ± 0.0014) and (0.012 ± 0.001) of Chlorpyrifos and (0.073 ± 0.0014), (0.031 ± 0.001) and (0.052 ± 0.0014) of Dichlorvos. This shows that the

concentrations of the pesticide residues of chlorpyrifos are higher than the MRL values of 0.01 mg/Kg as obtained from the literature with, percentage increase of 210%, 120% in goat III samples analyzed for chlorpyrifos. The sample analyzed for Dichlorvos shows, the pesticide residues values to be less than the MRL values of 1.00 mg/Kg with 7.3%, 3.1% and 5.2% less. This have shown that the samples in goat III were contaminated with chlorpyrifos pesticide residue while with dichlorvos, the goat III samples were not contaminated on the bases of the MRL value established by USFDA. OPPs were toxic and usually are not persistent in the environment as the OCPs. The organophosphates affected the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter.

3.5. Results of Pesticide Residue Levels of Goat 4 Samples

Table 4 shows Goat 4 samples and the mean ± S.D values (mg/Kg) of pesticides measured indicated no trace of organochlorine pesticide residues in the goat 4 samples analyzed. While, Organophosphorus pesticides residues, with particular emphasis to chlorpyrifos are detected in the intestine, kidney and liver in the ranged of (0.011 ± 0.0014), (0.009 ± 0.0007) and (0.013 ± 0.007) while, dichlorvos are detected in Chevon, kidney and liver in the following order; (0.043 ± 0.0007), (0.045 ± 0.0014), and (0.037 ± 0.0007) in Goat 4 samples. This indicates that organochlorines pesticides are not possibly use in the environment where these animals are obtained.

Table 4. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 4 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.051 ± 0.0007	0.053 ± 0.001	0.050 ± 0.0007
Dichlorvos	0.043 ± 0.0007	<0.001	0.045 ± 0.0014	0.037 ± 0.0007
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorine pesticide detected

The Organophosphorus pesticides, can be envisage for being use mostly by the rural farmers and in domestic activities at homes and institutions, which may be attributed to their presence in these samples. Table 4 indicates the pesticide residues level of chlorpyrifos above the MRL values of 0.01 mg/Kg with the corresponding percentage increase of 110%, 90% and 130% in intestine, kidney and liver of goat 4 samples determined. This implies that the samples analyzed were contaminated with chlorpyrifos with the MRL values above 0.01 mg/Kg of chlorpyrifos. The concentration of pesticide residue level of dichlorvos were significantly below the MRL value of 1.00 mg/Kg, with 4.3%, 4.5% and 3.7% respectively. These data showed no level of contamination in the samples analyzed.

3.6. Results of Pesticide Residues Level of Goat 5 Samples

Table 5 shows Goat 5 samples and the mean ± S.D values (mg/Kg) of pesticides residue levels analyzed which indicated no trace of organochlorine pesticide residue levels in the goat 5 samples analyzed. While, organophosphorus pesticides residues, with particular emphasis to dichlorvos were detected in the intestine, and kidney in the ranged of (0.035 ± 0.0014) and (0.021 ± 0.0007) while, chlorpyrifos were not detected in goat 5 samples. This indicated that organochlorine pesticides and chlorpyfos were not use in the environment where these animals were found. Organophosphorus pesticides (OPPs) are group of pesticide that are widely used to control pests and microorganism in household, public health, stored products and have been shown to have toxic effects in human and animals. The organophosphates affect the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter.

Table 5. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 5 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	<0.001	<0.001	<0.001
Dichlorvos	<0.001	0.035 ± 0.0014	0.025 ± 0.001	<0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorin pesticide detected

The Organophosphorus pesticides are often used by the rural farmers and in domestic activities and institutions as insecticides. The uses of organophosphorus as insecticide may be attributed to the presence in the analyzed sample. Table 4.10 indicates the concentration of pesticide levels of dichlorvos at significantly below the MRL Value of 1.00 mg/Kg, with 3.5% and 2.5% less respectively. These data further showed no level of contamination in the samples analyzed. The concentration of Anthracene, Diazinon, Dimethoate, Primifos-methyl and Malathion were below trace level of detection limit.

3.7. Results of Pesticide Residues Level of Goat 6 Samples

Table 6 shows Goat 6 samples and the mean ± S.D values (mg/Kg) of pesticide residue levels analyzed which indicated that organochlorine pesticide residues are below detection limit in the samples analyzed. While, organophosphorus pesticides residues are detected in intestine and liver as; Chlopyrifos (0.06 ± 0.001), (0.010 ± 0.0014) and Dichlorvos (0.029 ± 0.0014), (0.038 ± 0.0007), (0.021 ± 0.001) in Goat 1.

This result showed the concentration of chlorpyrifos pesticide residues to be above the recommended MRL value of 0.01 mg/kg with percentage increase of 60% and 100%. The positive decrease in pesticide residues are due to seasonal variation in weather and the usage of pesticides in the environment or region (US Agency, 2007). Dichlorvos concentration in the data also reveals the low concentration in relation to the MRL values of 1.00 mg/Kg with percentage decrease of 2.9% and 2.1%. From the assessment of this result, the samples of the intestine and liver were contaminated by chlorpyrifos in the other hand, the sample were not contaminated with dichlorvos.

Table 6. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 6 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.022 ± 0.001	<0.001	0.034 ± 0.001
Dichlorvos	<0.001	<0.001	<0.001	<0.001
Dichlopyrifos	<0.001	0.029 ± 0.0014	<0.001	0.021 ± 0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorine pesticide detected

3.8. Results of Pesticide Residues Level of Goat 7 Samples

Table 7. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 7 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	<0.001	<0.001	<0.001
Dichlorvos	<0.001	<0.001	<0.001	<0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorin pesticide detected

Table 7 shows Goat 7 samples and the mean ± S.D values of pesticide residues levels which indicated that organochlorine and organophosphorus pesticide residues are below detection limit in the samples analyzed. These results could either be due to none use of these pesticides in the environment or the systematic error; that deals with faulty instruments or equipment, procedural error, personal error and indeterminate which deals with irregular and unpredictable occurrences that may affect accuracy. Other factor may be attributed to none detect ability of these study might be gross error which had to do with carelessness in analytical procedure, improper recording of analytical data, results and errors in calculations.

3.9. Results of Pesticide Residues Level of Goat 8 Samples

Table 8 shows Goat 8 samples and the mean ± S.D values (mg/Kg) of pesticide residues levels analyzed which indicated that organochlorine pesticide residues are below detection limit in the samples. While; organophosphorus pesticides residue levels are detected in intestine, kidney and liver as; dichlorvos (0.026 ± 0.0014), (0.011 ± 0.0007), (0.013 ± 0.0007) in Goat III samples.

Table 8. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 8 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	<0.001	<0.001	<0.001
Dichlorvos	<0.001	<0.001	<0.001	<0.001
Dichlopyrifos	<0.001	0.026 ± 0.0014	0.011 ± 0.0007	0.013 ± 0.0007
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorin pesticide detected.

This result showed the concentration Dichlorvos below the MRL values of 1.00 mg/kg with percentage decrease of 2.6%, 1.1% and 1.3%. From the assessment of this result, the samples of the intestine, kidney and liver were not contaminated with dichlorvos based on the MRL values from literature.

3.10. Results of pesticide residues level of goat 9 Samples

Table 9 shows Goat 9 samples and the mean ± S.D values (mg/Kg) of pesticide residues determined indicated that organochlorine and organophosphorus pesticide residues are below detection limit in the samples analyzed. These results

could either be due to none use of these pesticides in the environment or the systematic error; that deals with faulty instruments or equipment, procedural error, personal error and indeterminate which deals with irregular and unpredictable occurrences that may affect accuracy. Other attribute to none detect ability of the pesticide residues could be due to, personal error or operative error which arises mainly from operators showing some personal prejudices and preferences in the analysis which might lead to an error. An example was the habitual filling of the calibrated volumetric glassware above the indicated mark; operators with blurred vision for color changes are prone to introduce errors in visual titration. The variability in replicate analysis, irregular and unpredictable forms of observation affect the accuracy that might be

achieved from this study. Indeterminate errors results in variability in replicate analysis, irregular and unpredictable. Other factor may be attributed to none detect ability of these study might be gross error which has to do with the carelessness in analytical procedure, improper recording of analytical data, results and errors in calculations. The errors affect accuracy and provide results that are precise but not accurate.

Table 9. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 9 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	<0.001	<0.001	<0.001
Dichlorvos	<0.001	<0.001	<0.001	<0.001
Dichlopyrifos	<0.001	<0.001	<0.001	<0.001
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorin pesticide detected

3.11. Results of Pesticide Residues Level of Goat 10 Samples

Table 10 Goat 10 samples and the mean ± S.D values (mg/Kg) of pesticide residue levels which indicated that organochlorine pesticide residues were below detection limit in the samples analyzed. While, organophosphorus pesticides residues were detected in intestine and liver as; chlopyrifos (0.013 ± 0.0014), (0.007 ± 0.0007) and dichlorvos (0.054 ± 0.0014) and (0.032 ± 0.001) in goat V.

This result shows the concentration of chlopyrifos pesticide residues to be above the recommended MRL value of 0.01 mg/Kg with percentage increase of 130% and 70%. The positive decrease in pesticide residues were due to seasonal variation in weather and the usage of pesticides in the environment or region (US Agency, 2007). Dichlorvos concentration in the data also reveals the low concentration in relation to the MRL values of 1.00 mg/Kg with percentage decrease of 5.4% and 3.2%. From the assessment of this result, the samples of the intestine and liver were contaminated by chlorpyrifos, while, on the other hand, the samples were not contaminated with dichlorvos.

Table 10. Concentration (mg/Kg) of Organophosphorus Pesticide Residues in Goat 10 Samples

Pesticide	Chevon	Intestine	Kidney	Liver
Anthracene	<0.001	<0.001	<0.001	<0.001
Chlopyrifos	<0.001	0.013 ± 0.0014	<0.001	0.007 ± 0.0007
Dichlorvos	<0.001	<0.001	<0.001	<0.001
Dichlopyrifos	<0.001	<.054 ± 0.0014	<0.001	0.032 ± 0.0014
Diazinon	<0.001	<0.001	<0.001	<0.001
Dimethoate	<0.001	<0.001	<0.001	<0.001
Primifos-methyl	<0.001	<0.001	<0.001	<0.001
Malathion	<0.001	<0.001	<0.001	<0.001

GC/MS Acqmethod pesticide, Detection Limit 0.001, No trace of Organochlorin pesticide detected

4. Conclusions

The findings of these study show that the concentration of pesticide residues in the animals shows the none detect ability of organochlorines pesticide residues in all the samples analyzed whereas, organophosphorus pesticides: Chlorpyrifos and Dichlorvos concentration were relatively high with chlorpyrifos and low with dichlorvos in the intestine, kidney and liver analyzed respectively. Anthracene, Dichlorpyrifos, Diazinon, Dimethoate, Primifos-methyl and Malathion were below detection limit or below the threshold of MRL. The differences might be attributed to environmental factors or where these pesticides were used by farmers, through water and feeds the animal may have access to the fodder. The concentrations of pesticide residue levels of chlorpyrifos pesticides in the internal organs were higher than the available MRL in the literature. The high concentration of chlorpyrifos is also similar to a study carried in Faisalabad-Pakistan. The concentration of Dichlorvos residues are below the detection limit in the animals as established by United States Food and Drug Administration (USFDA). The concentration of Anthracene, Dichlorpyrifos, Diazinon. Dimethoate, Primifos-methyl and Malathion in all the samples analyzed were below detection limit while, the study further revealed that no trace of organochlorine pesticides was detected.

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Conflict of interest: All authors declare no conflict of interest