RURAL POULTRY PRODUCTION IN TWO AGRO-ECOLOGICAL ZONES OF UGANDA

J. ILLANGO*, A. ETOORI*, H. OLUPOT, J. MABONGA
*Livestock Health Research Institute (LIRI),
Tororo, Uganda

Abstract

RURAL POULTRY PRODUCTION IN TWO AGRO-ECOLOGICAL ZONES OF UGANDA.

A baseline study on rural poultry production, management and health was conducted in six selected villages in an agro-pastoral and montane zone of Uganda during the wet and dry season. In the 114 rural households visited, the farmers were interviewed by using a questionnaire. Poultry flocks were examined and samples were collected for laboratory investigations. A free-range management system with mixed poultry species was practiced by farmers in both zones. The major poultry flock parameters in the agro-pastoral and montane zone were, respectively, mean flock size of 22 (with a range of 3-65) and 17.5 (with a range of 6-60); mean hen:cock ratio of 2.6 to 1 and 4.8 to 1; mean egg production per hen per year of 8.8 and 11.5; mean hatchability of 70.8% and 85.7%; mean chick mortality of 39.6% and 28.6%. The flock ownership was single, mixed or shared among family households. Women were more involved in most of the activities regarding poultry management, although in both zones a division of labour existed within the household. Men predominantly made the decisions on sale, consumption and treatment of poultry. The most important health problems in the flocks in both zones in the two seasons were coughing, diarrhoea, fowl pox and internal parasites. It was concluded that the major constraints affecting rural poultry production in the two zones were diseases especially Newcastle disease and parasites, inadequate housing and poor feed supplementation especially in the dry season. Women had important responsibilities in rural poultry production in the two zones. The findings form the basis for an assessment of the effects of interventions on rural poultry production in the two zones.

1. INTRODUCTION

In nearly all African countries, poultry production in rural areas is predominantly based on a free-range system utilising indigenous types of domestic fowl [1, 2]. The system is characterised by a family ownership of the birds. The birds are then left to scavenge to meet their nutritional needs. The feed resources vary depending on local conditions and the farming system. Housing may not be provided [3, 4, 5]. Where this is done, usually local materials are used for construction [5]. Management is minimal with some variations of gender roles in the activities [6, 7]. The health of the birds is not garanteed because there are no disease control programmes. The birds are exposed to many disease conditions. Newcastle disease has been noted as the most prevalent and devastating poultry disease in many African countries [8, 9, 10, 11]. Parasites are also prevalent due to favourable conditions [12, 13, 14]. Inspite of this low-input by rural farmers on their production, free-range birds play many socio-economic roles.

Uganda now has approximately 22.7 million birds [15]. Free-range birds constitute over 80% of that population [16]. They contribute to basic socio-economic welfare in rural families and various cultural roles which vary from community to community. Inspite of the introduction of exotic commercial birds in the 1960's indigenous birds have maintained a lead role in rural areas. In some parts of Eastern and Northern Uganda, birds are also used in a livestock stocking process by a barter system. In these areas, poultry keeping can be considered the beginning of livestock production. Newcastle disease is a major poultry disease in rural areas of Uganda [17, 18, 19]. In addition, parasitic conditions have also been noted [20, 21]. Diseases, poor management, insufficient breeding and nutrition are seen as major components affecting rural poultry production. No study has been conducted in Uganda to assess the effect and extent of these factors in rural poultry production. A study targeting rural poultry production in two agro-ecological zones was carried out with the overall objective of developing integrated and appropriate health management interventions.

2. MATERIALS AND METHODS

2.1. Study area

From the seven agro-ecological zones of Uganda namely agro-pastoral (Teso system), pastoral, montane, West-Nile, banana/coffee, banana/millet/cotton and Northern zones, two study zones were selected: agropastoral (Soroti) and montane (Mbale). The selection was based on the availability of a rural poultry population, the free-range system practiced in the areas and the proximity of the study areas to the duty station.

Following sensitisation, discussions with the district veterinary officials and extension staff of the selected districts, three villages were selected in each of the two zones (Table I). The selection was also based on the estimated poultry population using household numbers, their location in the district and absence of previous disease control interventions.

Ten farmers, mainly women, were randomly selected from each of the villages to participate in the survey. The farmers were sensitised and mobilised with assistance of local chiefs. They were notified of the dates of the household visits. They were also required to confine or tether six birds in each household.

2.2. Field activities

The following activities were conducted:

(a) Farmer interviews. These were conducted using a standardised questionnaire with assistance of local chiefs in case translation in the local language was required. Initially, each farmer was briefed on the objectives of the exercise, planned activities and the future benefits.
(b) Examination of the poultry flocks. The poultry flocks were clinically examined and in case of illness a tentative diagnosis was made and treatment was provided.
(c) Post-mortem examination. In the event of terminally sick birds or dead birds, post-mortem examination was done. Skin scrapings and parasites were collected and preserved in 10% formal saline and 70% alcohol. In addition, blood was collected from each bird using wing veins for the purpose of obtaining serum samples and preparating smears. Faecal samples were also collected.
(d) Laboratory work. The serum samples were aliquoted and stored at –20^{o}C. Blood samples and faecal samples were processed and examined for helminth eggs as described by Permin and Hansen [14].

The field activities were conducted during the wet season and repeated during the dry season in the same areas but using different farmers.

TABLE I. CHARACTERISTICS AND DETAILS OF STUDY SITES

Zone	District	County	Sub-county	Village	Village code	No. of farmers (wet season)	No. of farmers (dry season)
Agro - pastoral	Soroti	Soroti	Asuret	Omukunyo	A	12	9
		Soroti	Gweri	Awoja	B	10	10
		Serere	Atiira	Atiira	C	10	10
		Subtotal				32	29
Montane	Mbale	Bunghokho	Busoba	Manga	D	10	9
		Bulambuti	Bukalu	Bunambetye	E	10	4
		Bubulo	Shibanga	Shibembe	F	12	8
Total						64	50

3. RESULTS

The results are shown in tables II through X and figures 1 through 15.

TABLE II. MAIN PARAMETERS OF THE FLOCKS

Agro-pastoral zone (wet season)				Montane zone (wet seaon)			
Village	No. of households	Flock size	Average no. of birds/household	Village	No. of households	Flock size range	Average no. of birds/household
A	12	3-65	28	D	10	6-27	15
B	10	6-53	24	E	10	6-27	13
C	10	6-38	20	F	12	7-32	13
Agro-pastoral zone (dry season)				Montane zone (dry season)			
Village	No. of households	Flock size	Av. no. of birds/household	Village	No. of households	Flock size range	Av. no. of birds/household
A	9	7-42	22	D	9	6-20	13
B	10	7-55	21	E	4	20-60	38
C	10	3-40	17	F	8	10-18	13

TABLE III. PRESENCE OF OTHER SPECIES OF BIRDS

Zone	Village	Ducks	Guinea fowls	Turkeys	Pigeons
Agro-pastoral	A	2	0	25	0
	B	15	0	26	7
	C	14	0	25	19
	Total	31	0	76	26
Montane	D	14	6	8	0
	E	15	0	3	0
	F	0	0	2	0
	Total	29	6	13	0

TABLE IV. HEN PRODUCTION DATA IN THE WET SEASON

Zone	Village	No. hens	No. cocks	No. Eggs per year	No. eggs incubated	Chicks hatched	Hatchability (%)	Chicks reared	Chick mortality
Agro-pastoral	A	35	15	412	412	287	69.7	202	29.6%
	B	26	21	245	215	160	74.4	73	54.4%
	C	34	13	348	305	219	71.8	108	50,7%
Montane	D	31	6	418	325	297	91.4	219	26.2%
	E	28	9	329	316	273	86.4	163	40.2%
	F	29	7	358	263	232	88.2	148	36.2%

TABLE V. HEN PRODUCTION DATA IN THE DRY SEASON

Zone	Village	No. hens	No. cocks	No. eggs per year	No. eggs incubated	Chicks hatched	Hatchability (%)	Chicks reared	Chick mortality
Agro-pastoral	A	49	13	379	375	267	71.2	136	49.1%
	B	47	15	288	241	168	70.1	126	25.4%
	C	41	13	370	334	226	67.7	161	28.8%
Montane	D	23	4	201	173	135	78.0	99	26.7%
	E	19	3	198	168	148	88.1	119	19.6%
	F	34	7	376	276	227	82.2	175	22.9

TABLE VI. FEED SUPPLEMENTS AVAILABLE IN THE TWO ZONES

Zone	Wet season	Dry season
Agro-pastoral	Millet, sorghum, cassava, maize, sweet potatoes, termites, food residues	Maize, maize bran and food residues
Montane	Millet, sorghum, cassava, maize bran, brewer's waste, chick mash, rice bran and paw-paws	Maize, maize bran and food residues

TABLE VII. POST-MORTEM RESULTS*

Zone	Wet season	Dry season
Agro-pastoral	Mixed worm infestation (Ascariasis and Raillietina) Fowl pox and starvation	Mixed NCD and Histomoniasis
Montane	Bite wounds and septicaemia Fowl pox	Bumble foot with secondary infection Fowl pox

*It was noticed that farmers either sold or slaughtered sick birds

TABLE VIII. BLOOD SMEAR RESULTS

Zone	Wet season	Dry season
Agro-pastoral	*Plasmodium* spp.	*Plasmodium* spp.
Montane		*Plasmodium* spp.

TABLE IX. FAECAL SAMPLE RESULTS

Zone	Wet season	Dry season
Agro-pastoral	Segments of *Raillietina* spp. Eggs of *Heterakis, Ascaridia*	Eggs of *Capillaria, Ascaridia*
Montane	Eggs of *Ascaridia, Heterakis, Capillaria*	Eggs of *Heterakis*

TABLE X. PRESENCE OF ECTOPARASITES

Common name	Scientific name	Sites
Flees	Echidnophaga	Peri-ocular areas, wattles
Mites	Cnemidoptes	Body, leg (leg mange cases seen)
Lice	*Menopon* spp.	Body

* Ectoparasites were detected on birds in both zones.

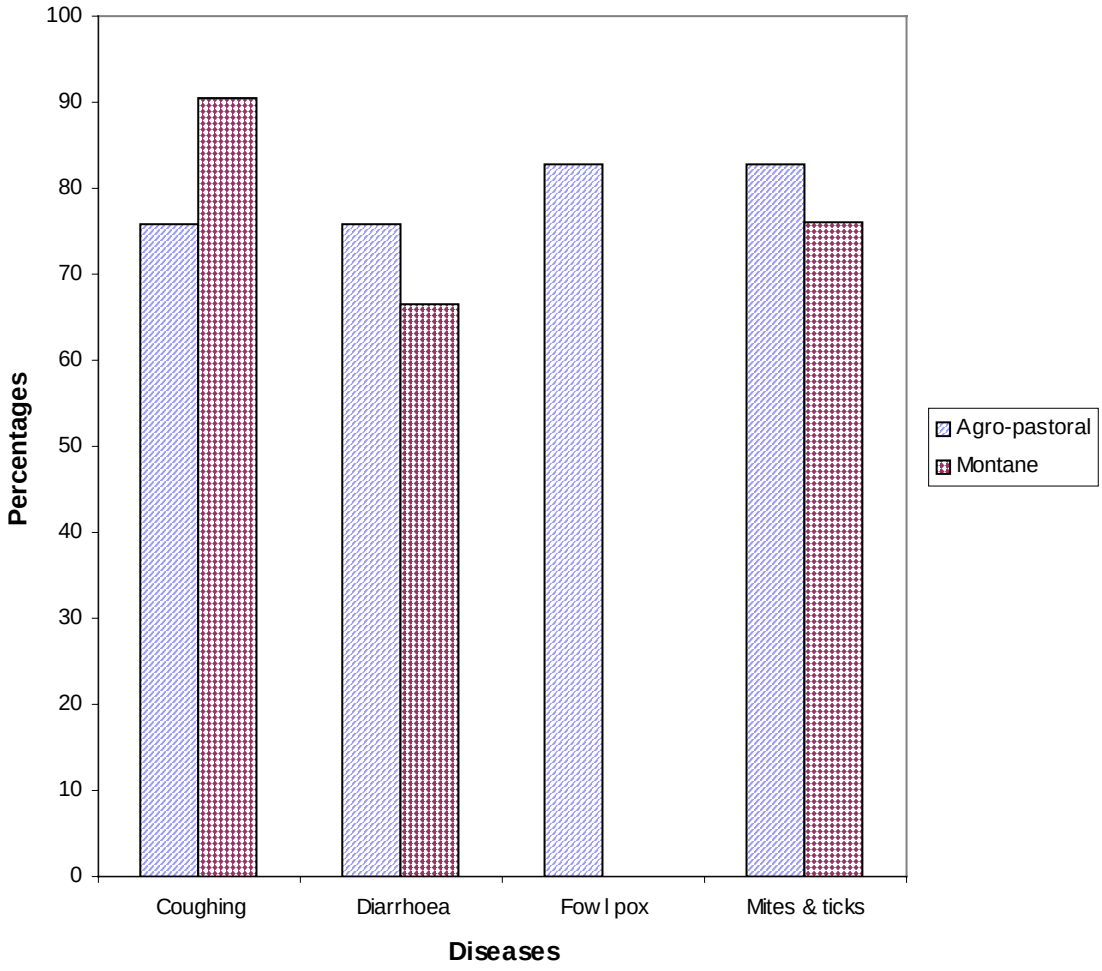

FIG.1. Presence of poultry diseases during the dry season.

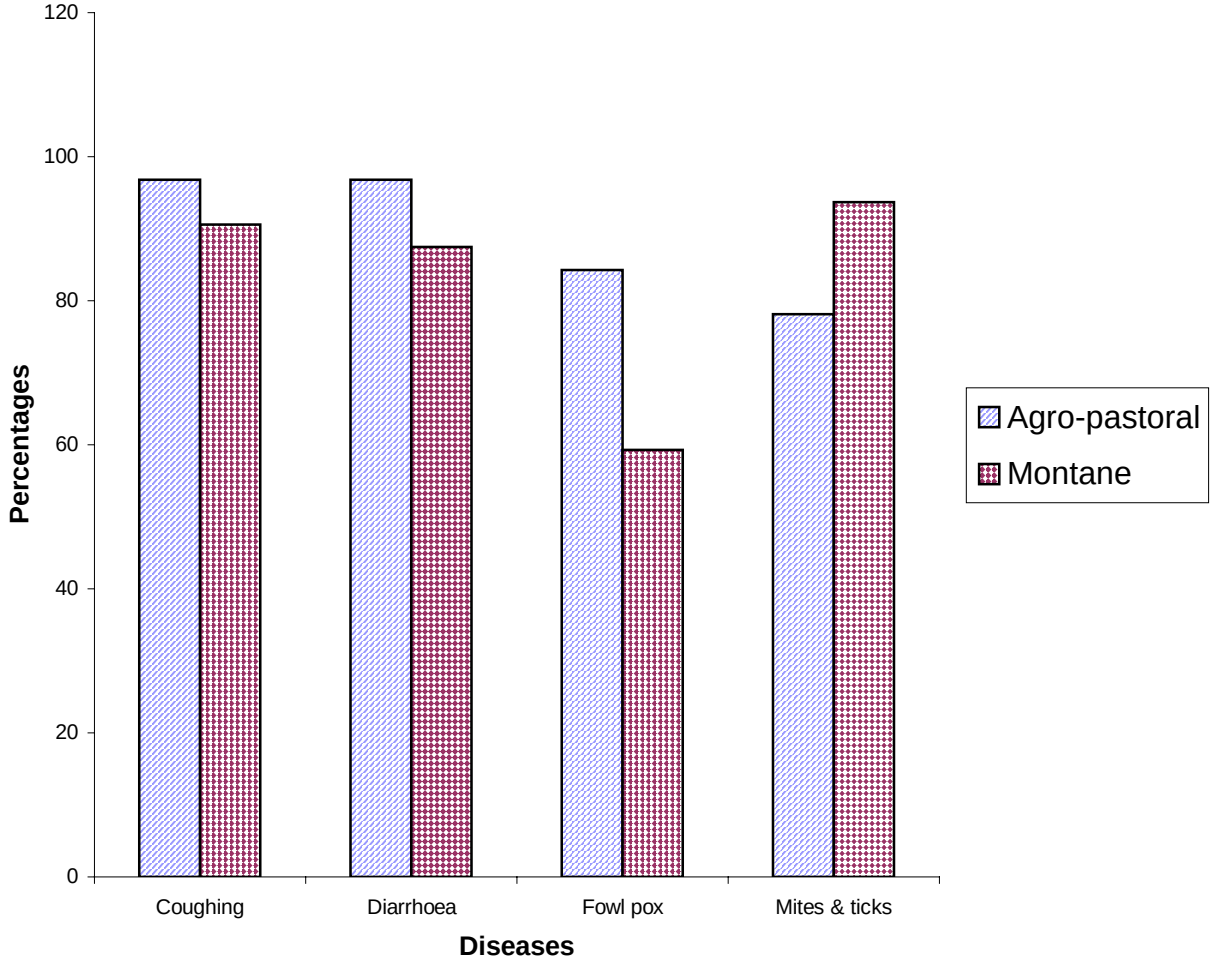

FIG.2. Presence of poultry diseases during the wet season.

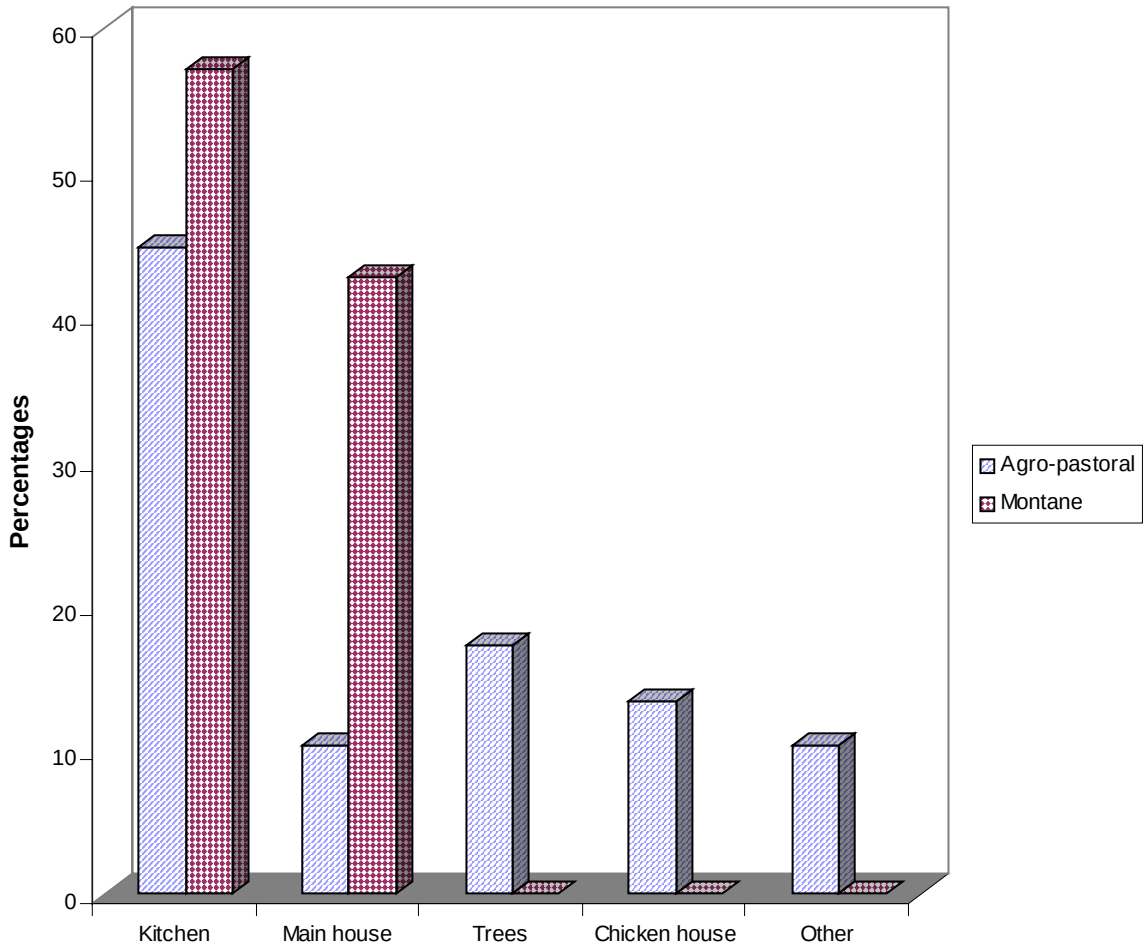

FIG. 3. Different types of housing during the dry season in the two ecological zones.

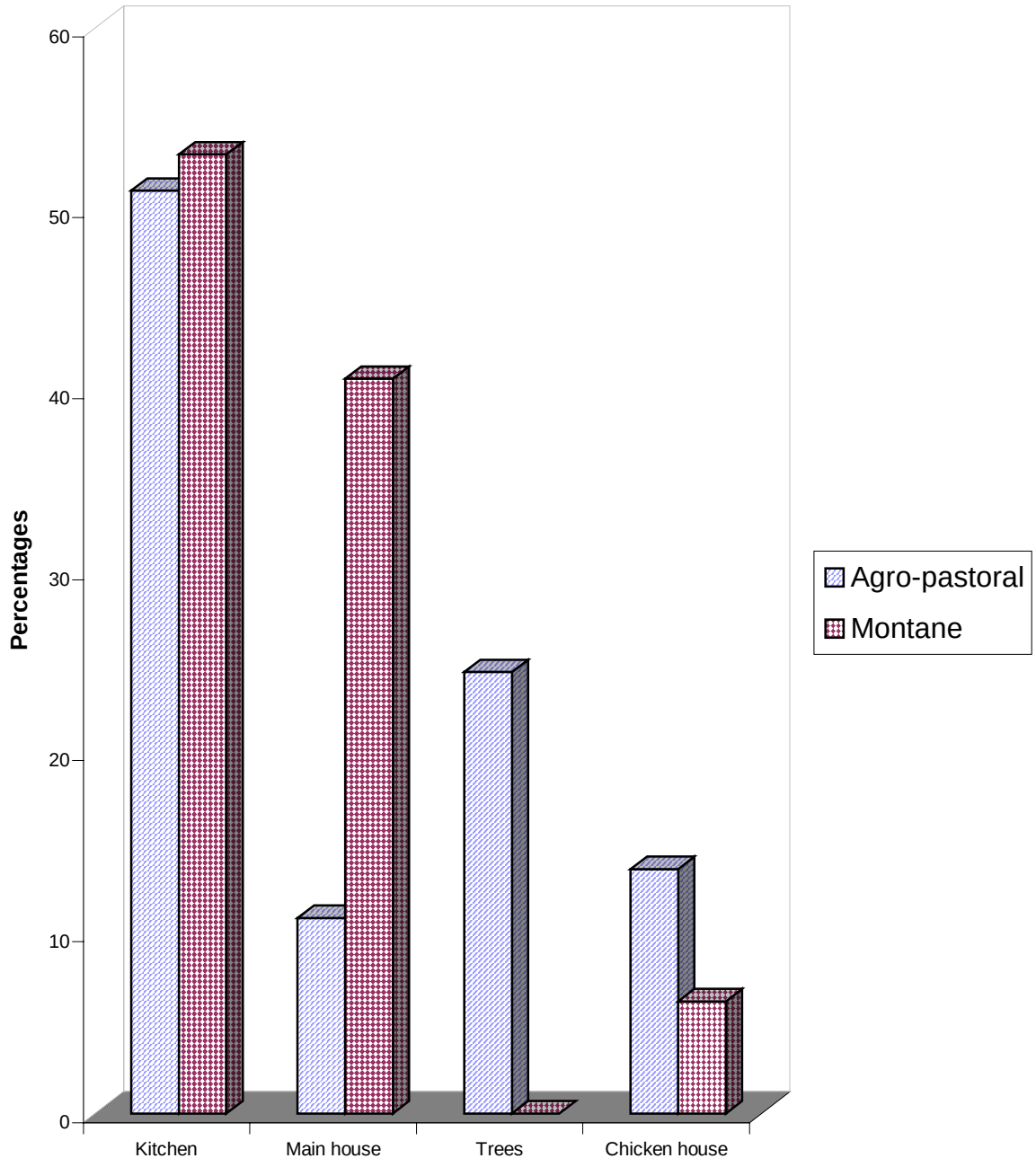

FIG. 4. Different types of housing during the wet season in the two ecological zones.

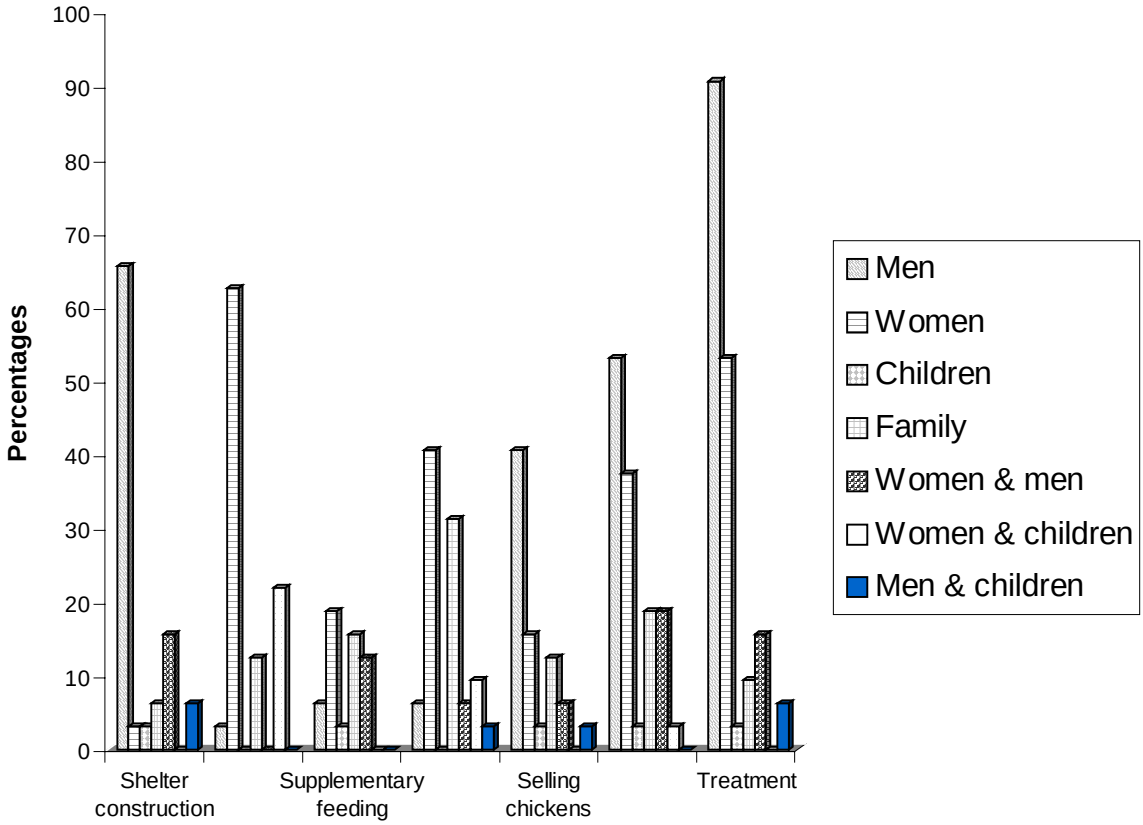

FIG. 5. Division of labour among household members with regard to various management duties in the agro-pastoral zone during the wet season.

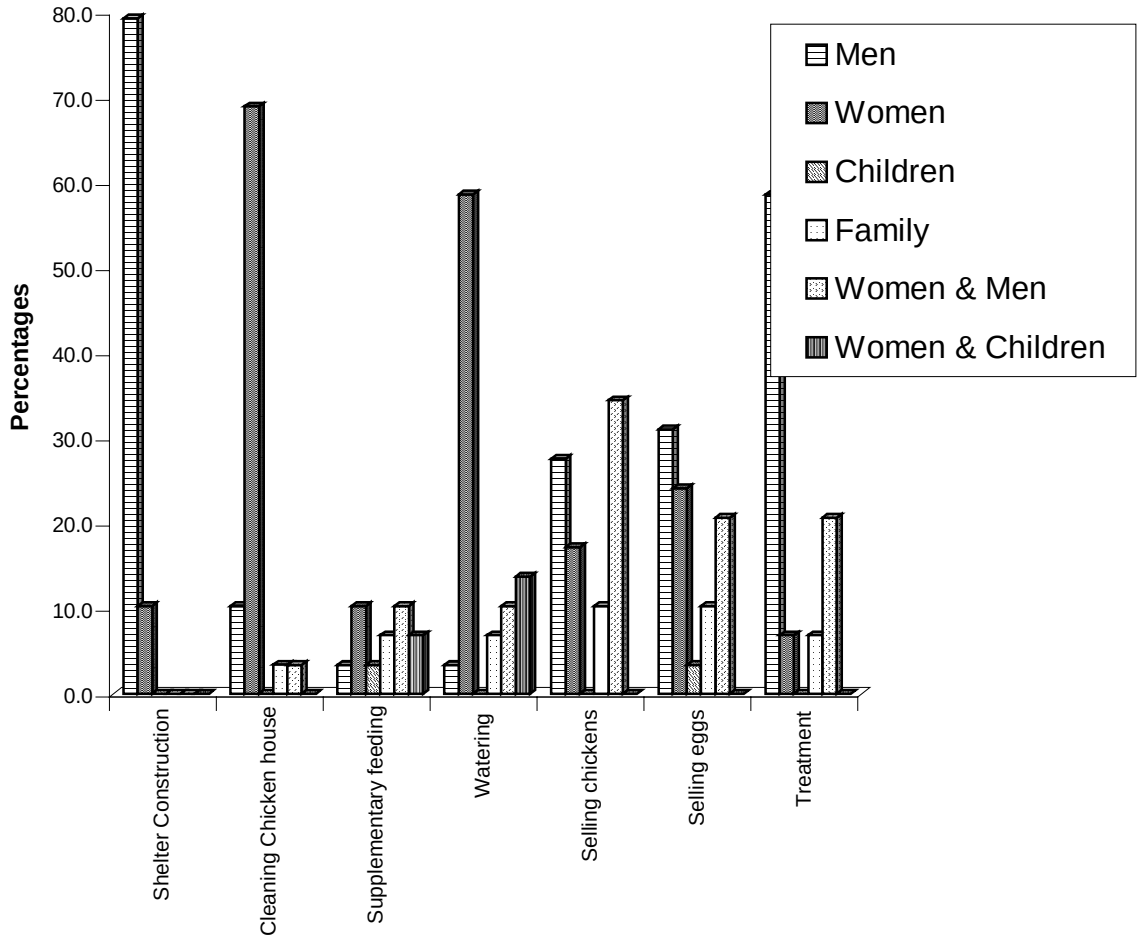

FIG. 6. Division of labour among household members with regard to various management duties in the agro-pastoral zone during the dry season.

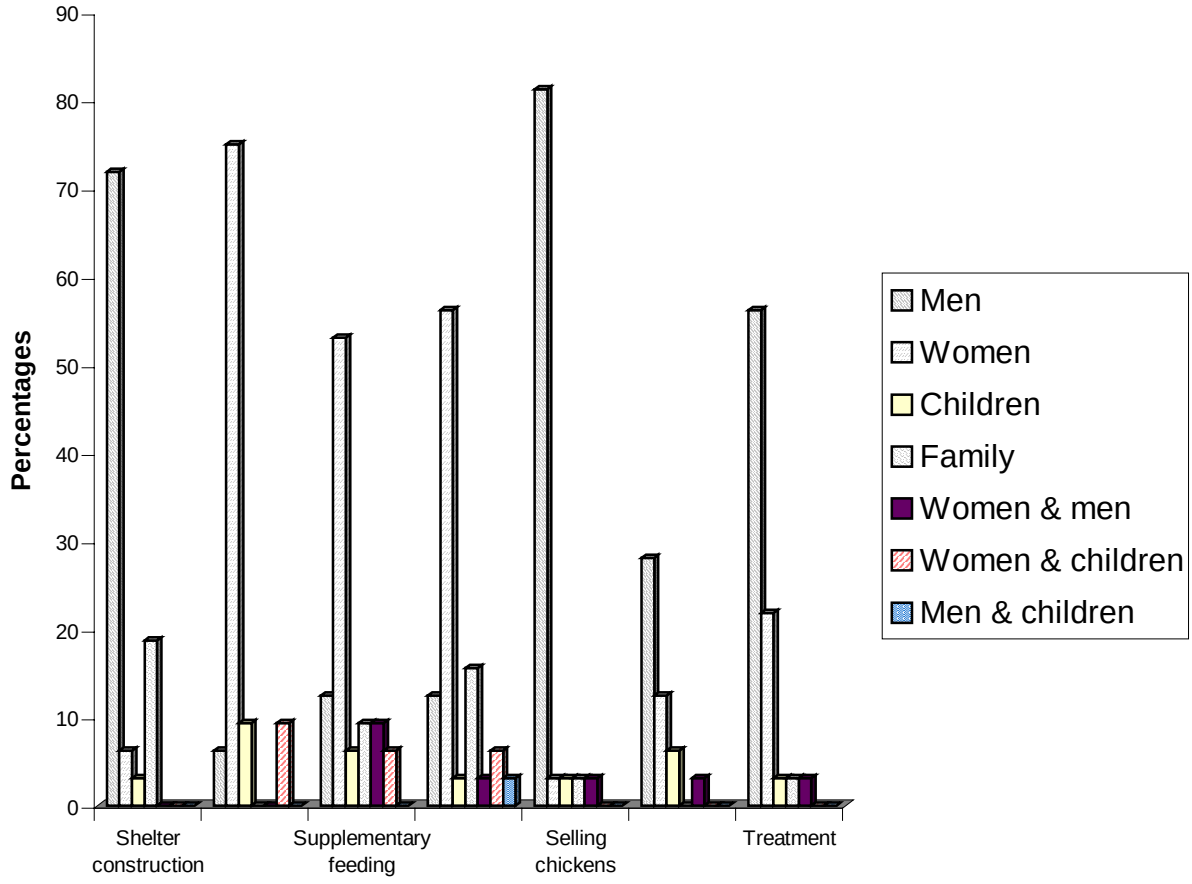

FIG. 7. Division of labour among household members with regard to various management duties in the montane zone during the wet season.

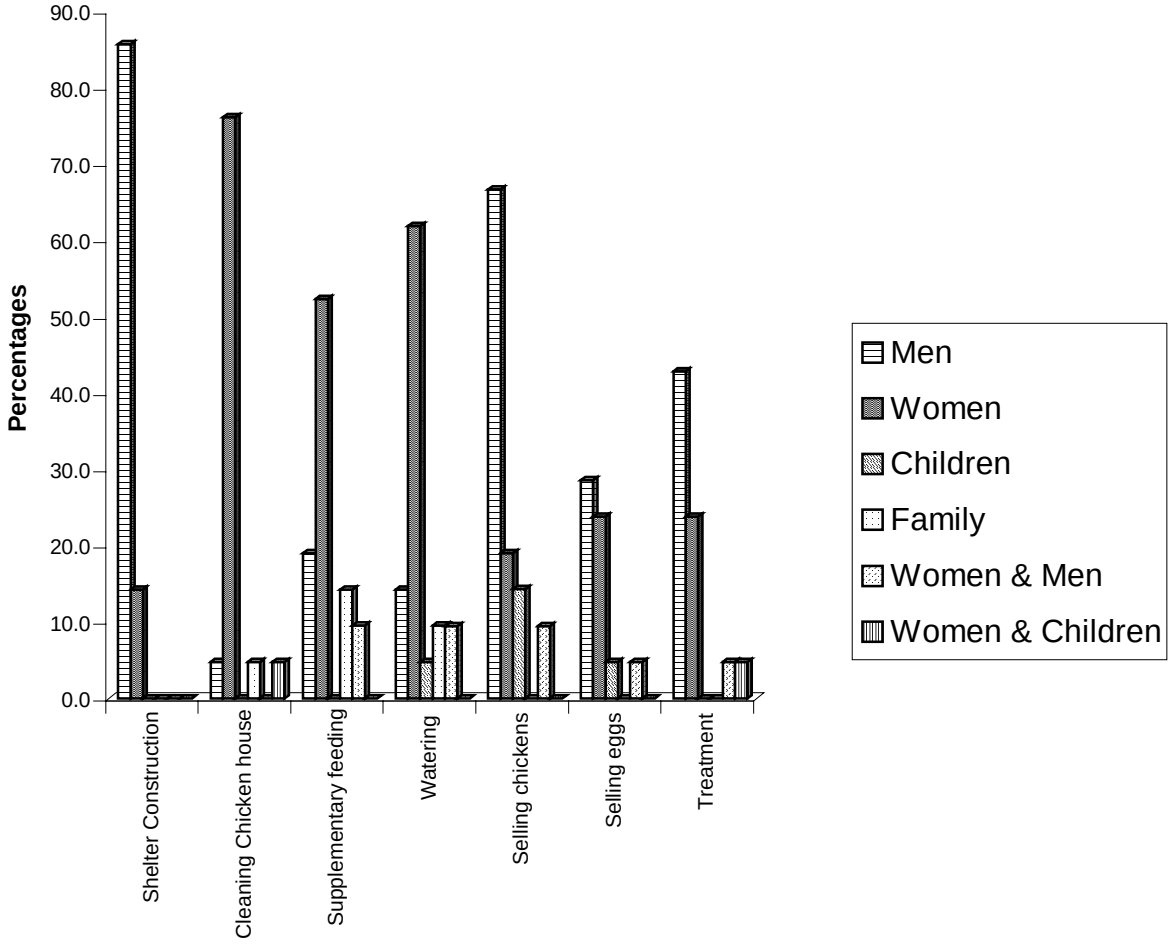

FIG. 8. Division of labour among household members with regard to various management duties in the montane zone during the dry season.

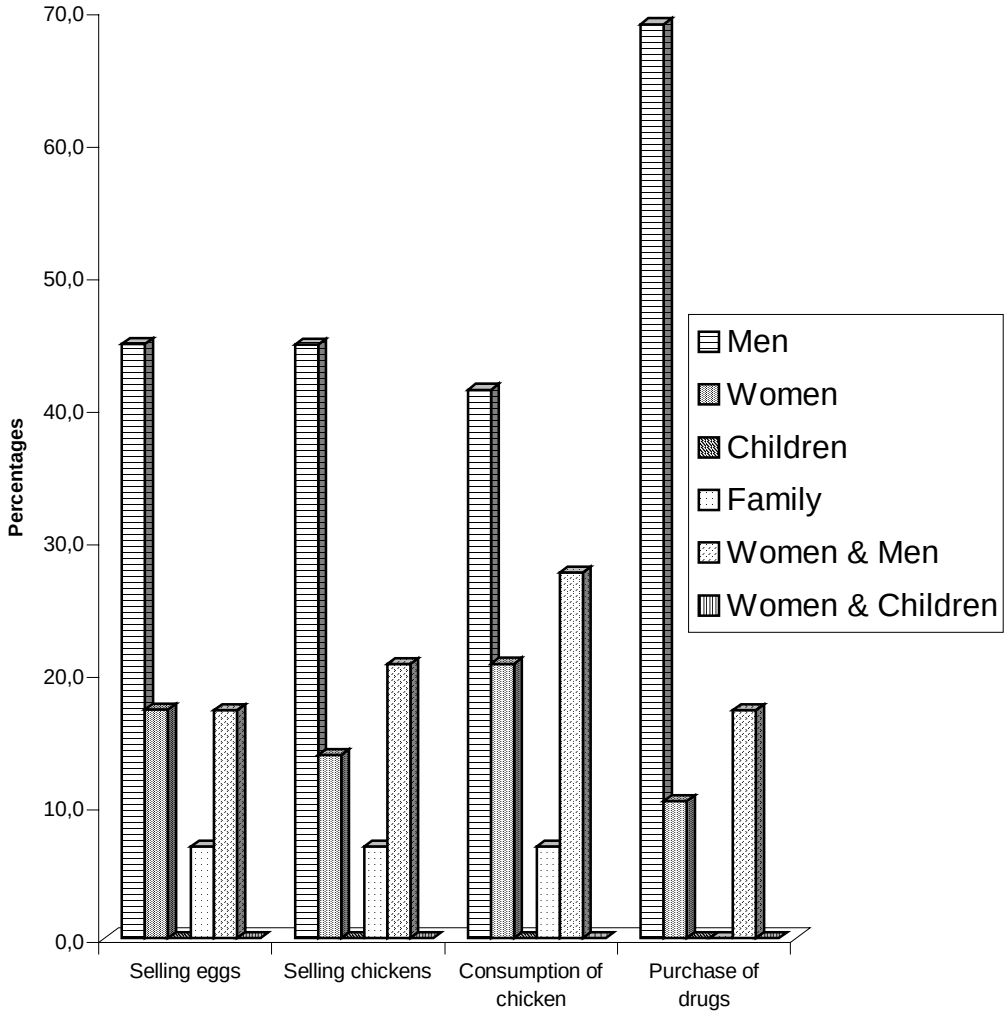

FIG. 9. Decision-making in poultry management in the agro-pastoral zone during the dry seaon.

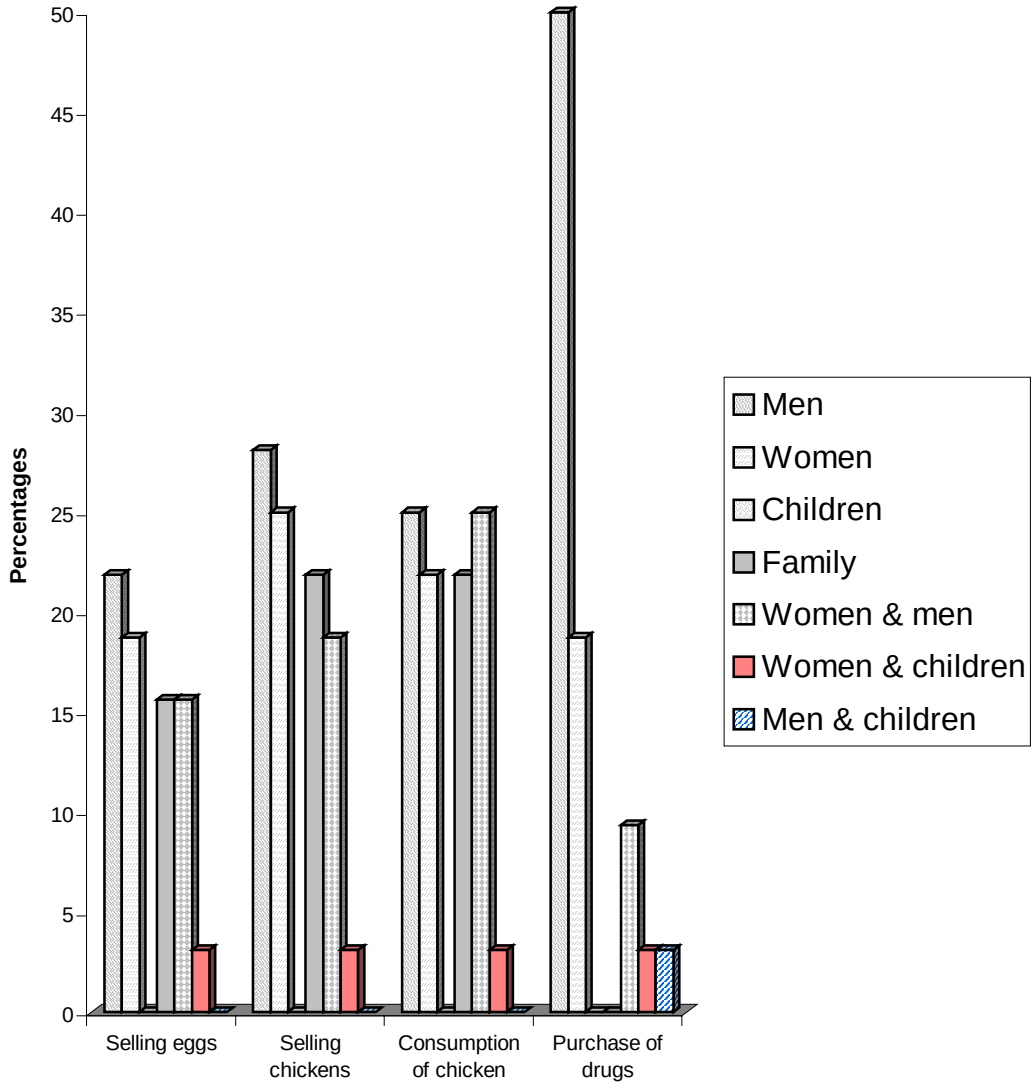

FIG. 10. Decision-making in poultry management in the agro-pastoral zone during the wet seaon.

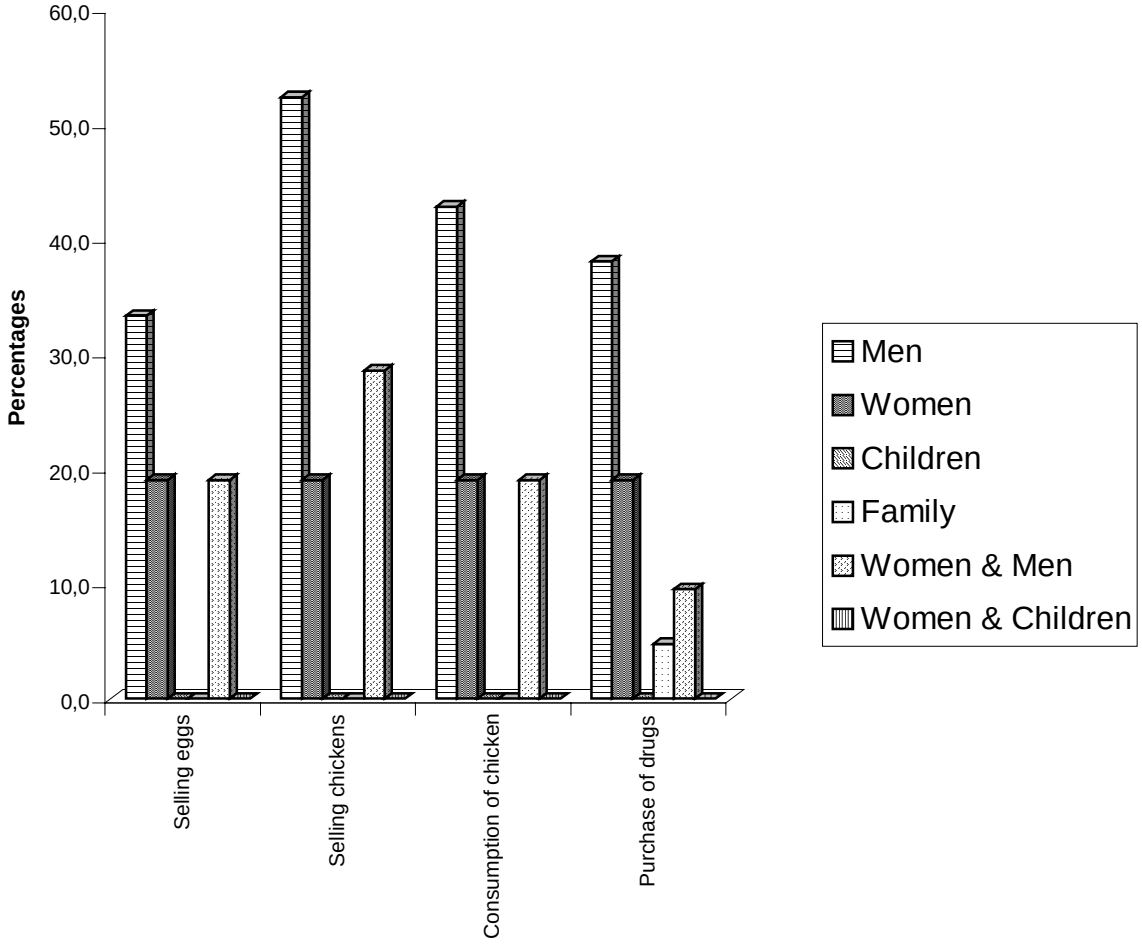

FIG. 11. Decision-making in poultry management in the montane zone during the dry season.

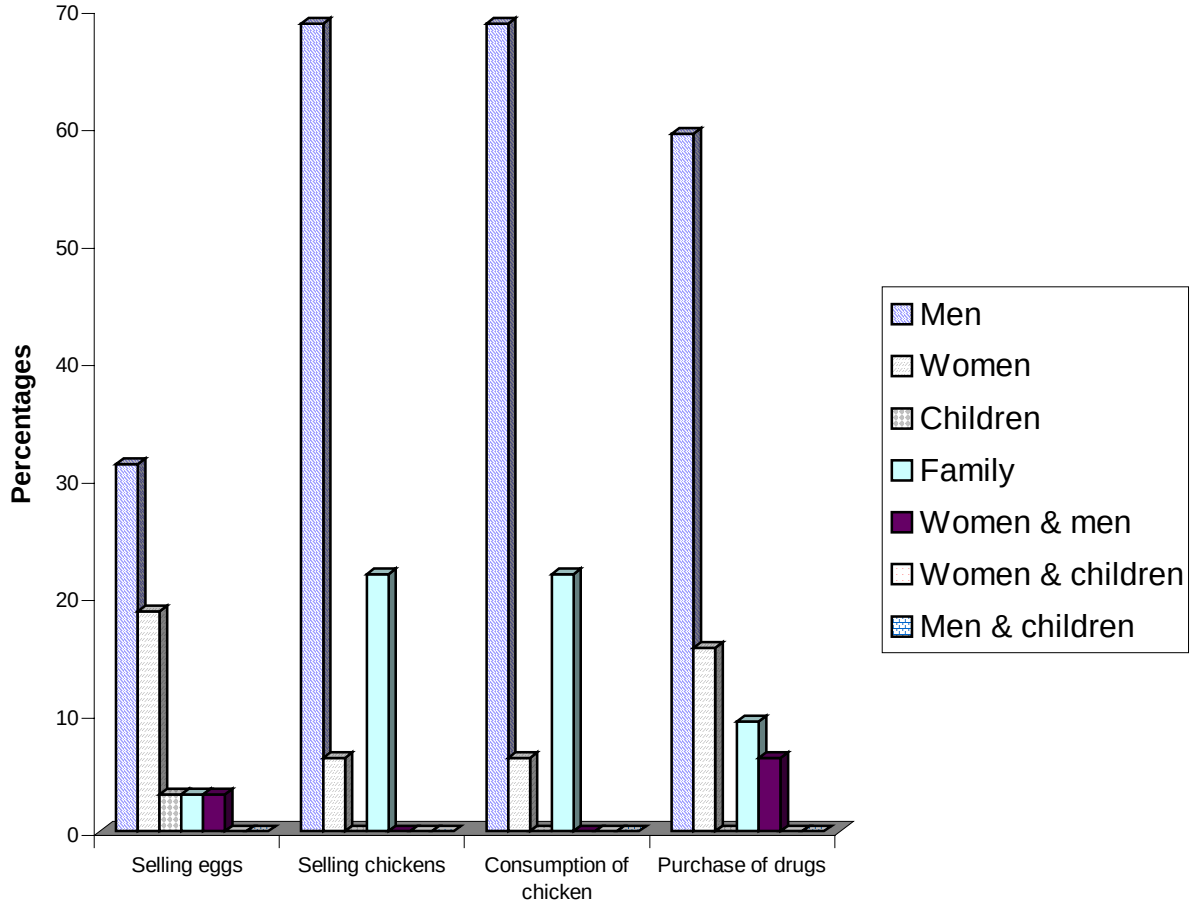

FIG. 12. Decision-making in poultry management in the montane zone during the wet season.

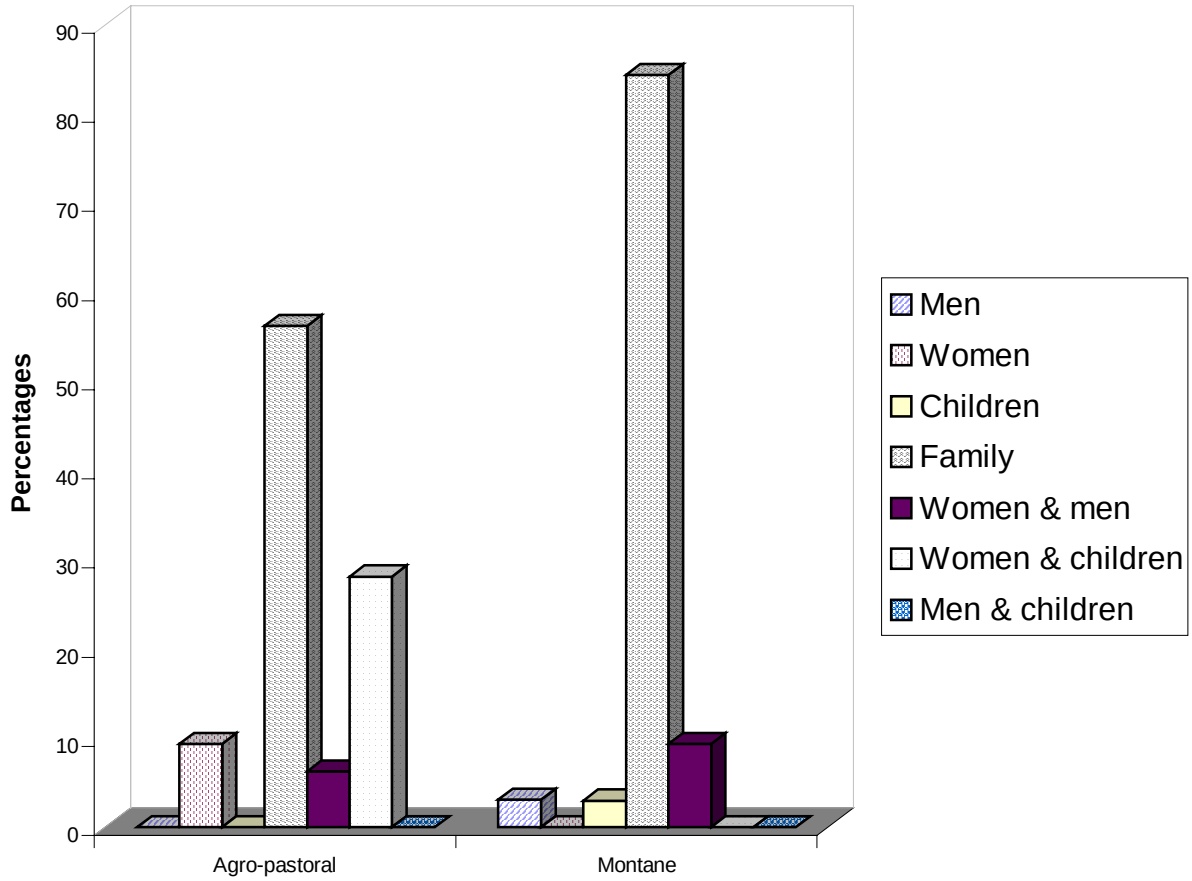

FIG. 13. Ownership patterns in the two ecological zones during the wet season.

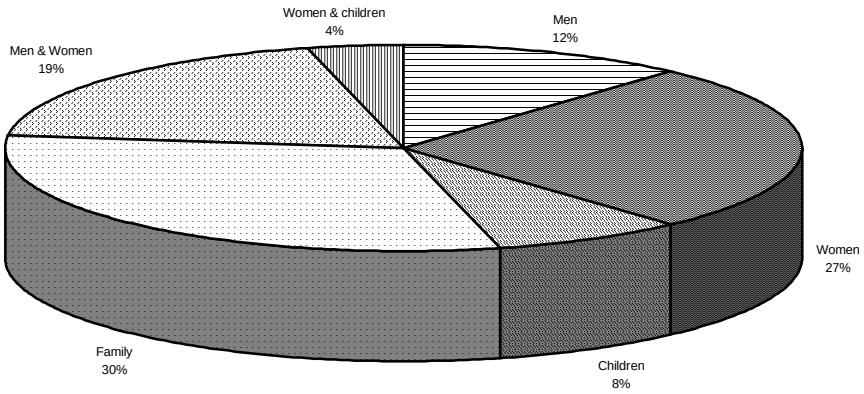

FIG. 14. Ownership pattern in the agro-pastoral zone during the dry season.

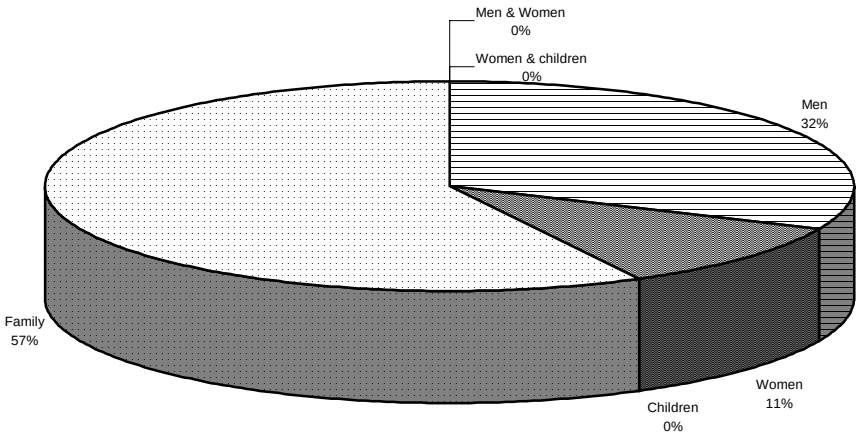

FIG. 15. Ownership pattern in the montane zone during the dry season.

4. DISCUSSION

Although rural poultry production by free-range management system is practised in all seven agro-ecological zones of Uganda, the selection of the agro-pastoral and montane zones for this study was based on their relatively higher rural poultry populations as established in the last National Livestock Census estimates [16]. This was also supported by the findings in the study. The mean household flock sizes in agro-pastoral villages were higher than those in the montane zone, 22 and 17.5, respectively. In both cases, these were well above the national mean estimate of ten birds per rural household [16]. These were also higher than those found in similar studies in the rural areas of Tanzania [22]. A wide variation was noted in the flocks with a range of 3-65. This is a common observation in many rural areas of Africa [1]. Flock size variation in rural areas has been attributed to the farming systems practised and local factors such as diseases and predators [4]. In any poultry set up, the proportion of hens in the flocks is an indication of egg and chick production [22, 23, 24]. In the zones, the hen:cock ratio in the montane zone was higher than that in the agro-pastoral zone, 4.6 to 1 and 2.6 to 1, respectively. This in both cases was below the recommended ratio for either the light and heavy poultry breeds [27]. This can be attributed to the lack of knowledge on poultry management and breeding by rural farmers and extension services. There was also a low egg production in the two zones. The mean egg production per hen per year was less than 12 in all the study villages in the two zones and seasons. The mean hatchability was, nevertheless, generally high especially in the montane zone with 85% and 70% for the agro-pastoral zone. Hatchability is affected mainly by hygienic and incubation conditions in the nests, egg quality, nutrition of the breeding hen, genetic factors and diseases [26, 27, 28]. It is possible that any of these factors was at play in the free-range rural system in the two zones. High hatchability can improve poultry production when there is good chick survival. However, it was found that chick mortality in the agro-pastoral zone was higher than that in the montane zone, with averages of 39.6% and 26%, respectively. Although the study did not establish the cause of chick mortality, it is likely that predators and diseases were responsible [29]. In the two zones the major health conditions noted in the flocks by over 60% of the farmers were cough, diarrhoea, fowl pox and parasites. Cough and diarrhoea are highly suggestive of Newcastle disease [30, 31, 32]. Newcastle disease is the most prevalent poultry disease in rural areas of Uganda [17, 18, 19]. This is also true in other African countries [33, 34, 35]. Very limited or no Newcastle disease vaccination is carried out in rural areas of Uganda [18]. The free-range system, therefore, facilitates the spread of both Newcastle disease and fowl pox through flock contacts. In addition, the role of wild birds and human factors in the epidemiology of Newcastle disease and other poultry diseases is apparent [30, 31, 32]. The high prevalence of parasites in poultry kept under free-range conditions in the two zones can be attributed to favourable environmental conditions and abundance of intermediate hosts [14]. Ecto-parasites especially mites, fleas and lice were reported by over 70% of the farmers. In the laboratory these were identified as *Cnemidocoptes*, *Echidnophaga* and *Menopon* species, respectively. Incidences of mange in chicken have been reported in rural poultry in Uganda [18]. With regard to endoparasites, earlier studies conducted in free-range chicken in Uganda showed a high prevalence of helminths especially *Ascaridia*, *Capillaria* and *Heterakis* species [20, 21]. These were also the major helminth parasites identified in a study in Nigeria [13]. The scavenging nature of the chicken is responsible for their high infestation [14, 36]. *Plasmodia* were the only haemoparasites recorded in both zones possibly indicating a high prevalence of both the parasite and its vectors. Lack of feed supplementation is one of the characteristics of a free-range system. In this study farmers in all zones reported providing feed supplements especially during the wet season. This consisted mainly of grains and food residues. These are the main food crops in the villages and provisions were made during harvests in the wet season. In the agro-pastoral zone farmers also provided termites as a major protein supplement. This has also been reported in rural villages in Togo [37]. The provision of housing for the chickens was inadequate. This was less than 20% in both zones. In most cases chicken were accommodated either in the kitchen or shared the house with family members. In the agro-pastoral zone, no housing for chicken was provided by at least 20% of the farmers. The birds had to perch on trees at night. Similar findings have been reported in rural areas of Zimbabwe [38], Mali [4] and Nigeria [5]. It is possible that this lack of housing in about 20% of households in the pastoral zone contributed to the relatively higher chick mortality of 39.6%. Six major poultry management activities were identified in the two zones namely, shelter construction, house cleaning, supplementary feeding, watering, sale of chickens and disease control by treatment. Of these, house construction and treatment of birds were predominantly done by men in both zones, while women, and to a lesser extent children were involved in the major management activities. This indicated a level of labour division among

rural households in the two zones and underlined the major roles women play in rural poultry production. Similar findings have been noted in Ethiopia, Gambia and Tanzania [1]. With regard to flock ownership, over 65% of the flocks were owned by a family as a unit in the montane zone compared to about 40% in the agro-pastoral zone. In both cases this pattern of ownership was higher than that by either men or women alone. A small proportion of ownership was by children. When the ownership pattern is related to decision-making especially in the sales of chicken and treatment, it was noted that men generally took decisions in the households in the two zones.

In conclusion, the results showed that the two agro-ecological zones have the potential for increased rural poultry production. The major constraints to rural poultry production in the two zones were Newcastle disease and parasites, inadequate poultry housing and poor feed supplementation especially during the dry season. Women played important roles in rural poultry production in both zones. The findings will form the basis for an assessment of the effect of interventions on health, housing, and feed supplementation of rural poultry production.

REFERENCES

[1] KITALYI, A.J., Village chicken production systems in rural Africa. Household food security and gender issue, FAO Animal Production and Health Paper 142. Rome, Italy (1998) 160 pp.

[2] HORST, P., Native fowl as a reservoir for genomes and major genes with direct and indirect effects on production adaptability. In: proceedings, 18th World Poultry Congress. Nagoya, Japan 4 – 9 September 1988 (1988) 105.

[3] HUCHZERMEYER, F.W., Free-ranging hybrid chickens under African tribal conditions. Rhodesian Agric. J. **70** (1973) 73-75.

[4] KUIT, H.G., TRAORE, A., WILSON, R.T., Livestock production in Central Mali: Ownership, management and productivity of poultry in traditional sector, Trop. Anim. Hlth Prod.**18** (1986) 222-231.

[5] ATUNBI, O.A., SONAIYA, E.B., An assessment of backyard poultry housing in Osogbo, Osun State, Nigeria, African Network for Rural Development Newsletter **4** (1994) 7.

[6] OLAYIWOLE, C.B., Rural women's participation in agricultural activities: implication for training extention home economists, Dissertation Abstract International **45** (1984) 1223.

[7] ACHIEMPONG, C.K., Women in poultry keeping for sustainability in Ghana. In: proceedings, 19th World Poultry Congress, Amsterdam, the Netherlands, 20-24 Sept. 1992 (1992) 71-78.

[8] CHABEUF, N., Disease prevention in smallholder village poultry production in Africa. In: proceedings, CTA Seminar on small holder rural poultry production. Thessaloniki, Greece 9 – 13 October 1990. Vol. 1 (1990) 129-137.

[9] CHRYSOSTOME, C.A.M., BELL, J.G., DEMEY, F., VERHULST, A., Seroprevalences to three diseases in village chicken in Benin, Prev. Vet. Med. **22** (1995) 257-261.

[10] BELL, J. G., KANE, M., LE JAN, C., An investigation of the disease status of village poultry in Mauritania, Prev. Vet. Med. **8** (1990) 291-294.

[11] YONGOLO, M.G.S., Epidemiology of Newcastle disease in village chickens in Tanzania, MVM dissertation, Sokoine University of Agriculture, Morogoro, United Republic of Tanzania (1996) 234 pp.

[12] ZARIA, T., SINHA, P.K., NATITI, L.S., NAWATHE, D.R., Ectoparasites of domestic fowl in an arid zone, African Network of Rural Poultry Development Newsletter **3** (1993) 7.

[13] TONA, G.O., Incidence of worms in chicken on farms in Ikorodou local government area of Lagos state, Nigeria, African Network of Rural Poultry Development Newsletter **5** (1995).

[14] PERMIN, A., HANSEN, J.W., Diagnostic methods. In: Epidemiology, diagnosis and control of poultry parasites, FAO Animal Health Manual, Rome (1998) 72-115.

[15] BAMUSONIGHE, T., The contribution of the Directorate of Animal Resources in agricultural development. Presentation at the scientific workshop on A century of Agricultural Research and Development in Uganda 6th – 8th Oct. 1998, Entebbe (1998).

[16] REPORT ON UGANDA NATIONAL CENSUS OF AGRICULTURE AND LIVESTOCK, Vol. IV Livestock Characteristics (1993). Ministry of Agriculture Animal Industry and Fisheries, Entebbe, Uganda (1993) 31-40.

[17] MUKIIBI-MUKA, G., Epidemiology of Newcastle disease in village chickens and the need to vaccinate them. In: Newcastle disease in village chicken. Control with thermo-stable oral vaccines. Ed. P.B. Spradbrow. Proceedings No. 39 ACIAR Canberra, Australia (1992) 155-158.

[18] DISTRICT VETERINARY ANNUAL REPORTS (1980–1998), Department of Veterinary Services and Animal Health, Ministry of Agriculture Animal Industry and Fisheries, Entebbe, Uganda.
[19] OJOK, L., Diseases as important factor affecting increased poultry production in Uganda, Trop. Landwirt. **94** (1993) 37-44.
[20] BWANGAMOI, O., Poultry helminth parasites of Uganda, Bull. Epiz. Dis. Africa **16** (1968) 429-459.
[21] SSENYONGA, G.S.Z., Prevalence of helminth in parasites of domestic fowl (*Gallus domesticus*) in Uganda. Trop. Anim. Hlth Prod. **14** (1982) 201-204.
[22] MWALUSANYA, N.A., Productivity and nutritional status of local chickens under village management conditions, INFPD Newsletter **2** (1999) 18-20.
[23] WILSON, R.T., TRAORE, A., KUIT, H.G., SLINGERLAND, M., Chick mortality in scavenging village chickens in Sri Lanka, Trop. Anim. Hlth Prod. **19** (1987) 229-236.
[24] ABDOU, I., BELL, J.G., Dynamique de la volaille villageoise dans la region de Keita au Niger. In: Village poultry production in Africa, proceedings of an international workshop held in Rabat, Morocco, 7-11 May, 1992 (1992) 6-11.
[25] VAN VELUW, K., Traditional poultry keeping in Northern Ghana, ILEIA **3** (1987).
[26] SAINSBURY, D., Breeding and hatching. In: Poultry Health and Management. 3rd edition, Blackwell Scientific Publications (1992) 109-114.
[27] AUSTIC, R.E., MALDEN, C., Nesheim, Factors in hatchability. In: Poultry production 13th edition, Lea and Febiger, Philadephia, USA (1990) 112-115.
[28] KABILIKA, H.S., MUSONDA, M.M., SHARMA, R.N., Bacterial flora from dead-in-shell chicken embryos in Zambia, Indian J. Vet. Res. **8** (1999) 1-6.
[29] DIPLEOLU, M.A., KERIPE, O.M., GBADAMOSI, O.M., GBADAMOSI, A.J., Chick mortality in indigenous chickens under free range system in Abeokuta, Nigeria, Nig. Vet. J.**19** (1998) 5-11.
[30] BEARD, C.W., HANSON, R.P., Newcastle disease. In: Diseases of Poultry, 8th edition, Eds. M.S. Hofstad, H. John Barnes, B.W. Calnek, W.M. Reid, H.W. Yoder Jr., Iowa state University Press, Ames, Iowa (1984) 452-470.
[31] COUTTS, G.S., Newcastle disease. In: Poultry Diseases under modern management, 3rd Ed., Nimrod Press Ltd., Hanks, UK (1991) 81-87.
[32] ALEXANDER, D.J., Newcastle Disease. In: Newcastle disease vaccines for rural Africa. Proceedings of a workshop held at the Pan African Veterinary Vaccine Centre (PANVAC). Debre Zeit, Addis Ababa, Ethiopia, 22-26 April 1991 Eds. M.M. Rweyemamu, V. Palya, T. Win, D. Sylla, (1991) 7-45.
[33] NAWATHE, D.R., Problems of Newcastle disease control. In: Viral diseases of animals in Africa, OAU/STRC, Scientific Publication, Lagos, Nigeria (1988) 301-311.
[34] BELL, J.G., Newcastle Disease in village chickens in north, west and central Africa. In: Newcastle disease in village chickens, Control with thermostable oral vaccines. Ed. P.B. Spradbrow, ACIAR Proceedings No. 39 Canberra, Australia (1992) 142-143.
[35] ALDERS, R.G., INOUE, S., KATONGO, J.C., Prevalence and evaluation of Hitchner B_1 and V_4 vaccines for the control of Newcastle disease in village chickens in Zambia, Prev. Vet. Med. **21** (1994) 125-132.
[36] PANDEY, V.S., DEMEY, F., VERHULST, A., Parasitic diseases. A neglected problem in village poultry in Sub Saharan Africa. In: Village poultry production in Africa. Proceedings of an International workshop Eds. V.S. Pandey, F. Demey (1993) 136-140.
[37] FARINA, L., DEMEY, F., HARDOUIN, J., Production of termites for poultry in villages in Togo, Tropicultura **9** (1991) 181-187.
[38] HUCHZERMEYER, F.W., Traditional poultry houses used by Rhodesian Africans, Rhod. Agric. J. **73** (1976) 155-157.