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Table of Contents: Volume 9 Number 12 December 2017

ARTICLES

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Full Length Research Paper

Nigerian Veterinarians'attitude and response to small animal pain management

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Nigerian veterinarians' attitude and responses to pain management predominantly in small animals were evaluated using a structured questionnaire. The questionnaires were administered to representatives of seventy small/large animal clinics and hospitals distributed across ten states of the country. The respondents possess the Doctor of Veterinary Medicine (DVM) (58.6%), Master of Veterinary Science MVSc (32.9%) degrees, fellowship diplomas (5.7%) and PhD (2.9%) degree. Majority of the respondents (92.9%) had less than 20 years of post DVM clinical experience. Seventy- nine percent (79%) had good understanding of animal pain perception while 43% still hold the misconception that some degree of pain is beneficial to an animal after surgery. Pain rating excellently assigned to fracture reduction by 83% of practitioners, but inappropriately assigned by 66% of practitioners to caesarean section, 66% to laparotomy, 63% to ovariohysterectomy, 60% to mastectomy and 60% to dental procedures. Xylazine, lignocaine and ketamine were anaesthetic/analgesics commonly used. Respondents (98%) recognized pain based on animal's response to painful body part palpation, attitude of animal (97%), history by care giver (80%) and inappetence (73%). Determinants of analgesic drug choice for dogs/cats were: analgesic efficacy (99/29%); potential for toxicity (95/38%); availability (93/43%), side effect (86/42%), cost (82/37%), availability of information on the drug (76/36%), and ability of analgesic drug to cause sedation in the animal (65/33%). Respondents sourced information for analgesic therapeutics from: literature (73%), internet (80%), and drug leaflet (98%). In conclusion, most veterinarians surveyed had understanding of animal pain perception and use anaesthetic protocols that provide analgesia. Nonetheless, some of them still hold on to the misconception that minimal pain perception is beneficial to the patient at the post-operative period which may have influenced their non-provision of additional analgesia post-operatively.

Key words: Pain, management, small animals, Nigerian veterinarians.

INTRODUCTION

Global response to pain concerns of veterinary patients' is on the increase (Joubert, 2001; Brearley, 2003; Flecknell, 2008; Lorena et al., 2014). Animals experience significant pain perception contrary to previous assumptions (Flecknell, 2008). Recent advances in research have shown that animal species; reptiles, birds,

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and mammals, possess the neuro-anatomic and neuro-pharmacologic components necessary for the transduction, transmission and perception of noxious stimuli (Flecknell, 2008; Lorena et al., 2014).

Pain types, be it nociceptive; inflammatory or pathologic, induce complex systemic derangements with severe physiologic and emotional consequences (Flecknell, 2008; Zaki, 2013, Epstein et al., 2015). This makes animal pain alleviation not just a professional obligation by veterinarians, but a key element of compassionate, humane patient care necessary to successful management outcomes. Professional approach to pain management demands pre-empting and recognising pain perception, understanding relief modalities and instituting the best pain therapy. Despite the large empirical data on animals' pain perception studies (Capner et al., 1999; William et al., 2005; Hewson et al., 2006; Joubert, 2006; Weber et al., 2012), there is still an overall general low usage of analgesics in veterinary medicine (Flecknell, 2008; Bell et al., 2014).

Following Hansen and Hardie`s (1993) report on the attitude of veterinarians to pain recognition and management in companion animals, several articles have been published on the subject (Capner et al., 1999; William et al., 2005; Hewson et al., 2006; Joubert, 2006; Weber et al., 2012). A position paper by the American Animal Hospital Association (AAHA) and the American Association of Feline Practitioners (AAFP) has also helped to standardize approach to pain management in dogs and cats (Epstein et al., 2015). Similar articles have evaluated veterinarians attitude on analgesic usage in dogs and cats among Brazilian (Lorena et al., 2014), New Zealand (Williams et al., 2005), French (Hugonnard et al., 2004), Finnish (Raekallio et al., 2003), Canadian (Hewson et al., 2006), South African (Joubert, 2001) and the British (Capner et al., 1999) practitioners.

There is however a dearth of information on veterinarians attitude and perception of analgesic usage in clinical practice in Nigeria. If humane animal patient care through proper usage of analgesic modalities will be achieved globally, assessment of a country's veterinarians' perception, attitude and use of analgesics for animal pain management cannot be over-emphasized. This paper therefore reports veterinary practitioners' perception and attitude to analgesic usage especially in small animal patient management in Nigeria.

MATERIALS AND METHODS

Survey instrument design, pre-test and reliability

A structured questionnaire was developed to evaluate and access veterinarians' perception of analgesia need and its provision to small animals in Nigeria. The questionnaire consisted of seven parts with questions pertaining to: Clinician's demography, practice type and case load, assessment of veterinarians' understanding of/ attitude to pain and pain control in animals, assessment of pain rating for various surgical procedures, assessment of criteria for pain recognition/ evaluation, assessment of determinants of analgesic drug choice, assessment of analgesic type for selected surgical procedures in dogs and cats, and assessment of source of knowledge for pain recognition and treatment. The Likert's scale was adopted as respondent indicator for the study. A draft version of the questionnaire was validated through experienced veterinarians, and their comments used to modify the final version of the instrument. Additional validity and reliability (internal consistency) of instrument sample data was high with the Cronbach Alpha reliability coefficient of 0.76.

Instrument administration

The questionnaires were administered between December 2016 and March 2017. Some of the questionnaires were administered at state's veterinary medical association meetings while others were delivered to clinicians at their practice locations.

Enrolment criteria

Veterinary practitioners in small and mixed practice were enrolled. One questionnaire was served to each practice even when more than one clinician works in the same clinic or hospital. Incompletely filled questionnaires were not used in the analysis.

Data analysis

The responses (Practitioners' bio-data and questions) were coded and entered into Microsoft windows excel spread sheet (Version 2010). Data generated within each section were presented in percentages with standard deviations.

RESULTS

Demography, location and practice type of respondents

Representatives, (males, 51 and females -19) of 70 veterinary clinics distributed across 10 states of Nigeria (Figure 1) participated in the survey. Majority of the respondent veterinarians have less than twenty years post DVM clinical experience (92.9%) with very few (7.2%) having over 20 years' experience. The highest academic qualification of many of the respondents is DVM (58.6%) while the lowest qualification is PhD (2.9%). A total of 32.9% respondents have a second degree (MVSc) and 5.7% have fellowship diplomas. The largest percentage of the clinics (58.6%) operated mixed practice (small and large animals), while 40% handle small animal patients alone with 1.4% handling only large animal patients.

Assessment of veterinarians' attitudes to pain relief

Most of the respondents (79%) agreed that animals feel pain. Some respondents (56%) believe that pain control is necessary following animal surgeries, while others (43%) feel some degree of pain is beneficial to the animal after surgery (Table 1).

Assessment of practitioner's pain rating of surgical procedures

If analgesic was not administered within 24 h following surgical procedures, 83% of practitioners rated fracture reduction to elicit the most severe pain, followed by caesarean section (66%), laparotomy (66%), ovariohysterectomy (63%), mastectomy (60%), and dental procedures (60%). Procedures rated as producing mild to moderate pain by a large number of respondents included surgical repair of aural haematoma (83%), burn wound debridement (78%), wound stitching (74%) and orchiectomy (72%). Cherry eye and skin tumour excision were rated to produce moderate to severe pain by 72 and 70% respondents respectively. One or two respondents indicated that the animal feels no pain without analgesic provision in the first 24 h of surgery following aural haematoma, skin tumour excision, caesarean section, laparotomy, dental procedures, orchiectomy, wound stitching and cherry eye repair (Table 2).

Assessment of criteria for pain recognition/evaluation

Most respondents (98%) recognize pain based on the animal's response to palpation of painful body part, followed by the animal's attitude (97%), information by care-giver (80%) and inappetence (73%) (Table 3).

Assessment of factors influencing analgesic choice

Analgesic efficacy, potential for toxicity and drug availability were the major factors that influence choice of analgesics among other factors by practitioners (Table 4).

Assessment of analgesic drugs used for surgical procedures in respondents' practices

Lignocaine by site infiltration was mostly used for aural haematoma (surgical repair) (46%); wound repair, (51%); orchiectomy (46%); wound debridement (44%) and dental procedures (29%). Xylazine was mostly used for skin tumour excision (33%); cherry eye repair (31%); fractures (31%); laparotomy (30%) and ovariohysterectomy (30%). Ketamine, lignocaine and bupivacaine were mostly used for caesarean section (Table 5).

Assessment of source of knowledge about recognition and treatment of pain

All the respondents had knowledge about pain recognition and treatment through practice experience, and additional knowledge through literature (87%), internet (79%) and drug leaflet (77%) (Table 6).

DISCUSSION

The results of this study showed that Nigerian veterinary practitioners have understanding of animals' pain indicators and the need for pain amelioration. It is noteworthy that the survey of veterinary clinics and hospitals representatives rather than individual practitioner may have been responsible for the smaller sample size in comparison with previous studies (Dohoo and Dohoo, 1996a,b; Watson et al., 1996; Capner et al., 1999; Lascelles et al., 1994; Williams et al., 2005; Hewson et al., 2006; Joubert, 2006; Weber et al., 2012).

Survey of clinic and hospital representatives was necessary to prevent repetition of information that may defeat the objective of the survey. Most of the veterinarians surveyed manage small animals predominantly, although a good number do see few large animal patients. Most of the respondents had their practice in the Southern part of Nigeria. Previous studies have established the predominance of small and mixed practice in the southern part of the country due to predominance of dogs for companionship and security concerns (Eyarefe and Oyetayo, 2016). The greater percentage of male than female respondents may not reflect the actual picture of male to female veterinary practitioner's ratio in the country, since the statistics captured practice representatives although a previous study had also given a capture with similar ratio (Eyarefe and Oguntoye, 2016).

Pain relief is very important in animal patient management, irrespective of pain type (nociceptive; inflammatory or pathologic). Some Nigerian practitioners however still uphold the misconception that some amount of inflammatory pain is beneficial to animal patient following surgery (Table 1). This shows that many veterinary practitioners may require more awareness on current information about animal pain perception and management in line with global best practice (Mathews et al., 2014).

Majority of the practitioners assigned pain rating for fractures correctly but pain rating for other procedures incorrectly (Table 2). A clinician's pain rating skill could influence his sense of judgment of analgesia requirement for a patient, and this could be a disadvantage to the patient if his pain assessment skill is imperfect (Mathews, 2000; Epstein et al., 2015). Virtually, all the respondents recognized pain based on patients' attitude (Table 3). Behavioral change often accompanies pain, and therefore, a key point in pain recognition, and management (Fox, 2014).

Practitioners' choice of analgesic drug for dogs and cats were influenced by drug efficacy, availability and cost among others (Table 4). Noticeably, more than half

Table 1. Assessment of veterinarians attitudes to pain relief in animals.

S/N	Statements	No response (%)	Strongly agree (%)	Agree (%)	Disagree (%)	Strongly disagree (%)	$\bar{x}$	SD
1	Animals do not feel pain	4 (5.7)	6 (8.6)	5 (7.1)	6 (8.6)	49 (70)	1.43	1.02
2	Pain threshold in animals is higher than in man (humans feel more pain than animals for the same type of surgery)	6 (8.6)	8 (11.4)	29(41.4)	16(22.9)	11 (15.7)	2.31	1.14
3	Some degree of pain following surgery is beneficial in animals	4 (5.7)	5 (7.1)	25(35.7)	21 (30)	15(21.4)	2.17	1.04
4	Pain control is unnecessary following animal surgeries	2 (2.6)	2 (2.6)	4 (5.7)	23 (32.9)	39 (55.7)	1.50	0.78

SD, Standard deviation.

Table 2. Assessment of pain rating for various procedures.

S/N	Procedure	No response (%)	No pain (%)	Mild pain (%)	Moderate pain (%)	Severe pain (%)	$\bar{x}$	SD
1	Aural haematoma (surgical repair)	1 (1)	1 (1)	18 (26)	40 (57)	10 (14)	1.90	0.76
2	Wound repair (stitching)	1 (1)	2 (3)	19 (27)	33 (47)	15 (21)	1.91	0.81
3	Wound debridement (burn wounds)	1 (1)	0 (0)	27 (38.6)	27 (38.6)	15 (21.4)	1.86	0.80
4	Cherry eye repair	5 (7.1)	2 (2.8)	13 (18.6)	30 (42.9)	20 (28.6)	2.24	1.06
5	Skin tumour excision	2 (2.9)	1 (1)	11 (16)	29 (41)	27 (39)	2.27	0.85
6	CS	2 (3)	1 (1)	5 (7)	16 (23)	46 (66)	2.63	0.77
7	Laparatomy	1 (1)	1 (1)	6 (9)	16 (23)	46 (66)	2.59	0.77
8	Fractures	3 (4)	0 (0)	2 (3)	7 (10)	58 (83)	2.90	0.54
9	Mastectomy	0 (0)	0 (0)	8 (11)	20 (29)	42 (60)	2.49	0.70
10	Ovariohysterectomy	1 (1)	0 (0)	8 (11)	17 (24)	44 (63)	2.54	0.72
11	Dental procedures	1 (1)	1 (1)	10 (14)	16 (23)	42 (60)	2.46	0.81
12	Orchiectomy	1 (1)	1 (1)	18 (26)	32 (46)	18 (26)	2.00	0.80

SD, Standard deviation.

of the respondents did not give any response concerning cats (Table 4). This may be because they either rarely see cats or have never seen cats before in their practice. The low case load of cats in the survey is due to the general negative myths associated with cat keeping (Eyarefe and Oyetayo, 2016). Drug availability for pain management is an important factor influencing drug choice in poor resource settings. Apart from tramadol and pentazocine which are available as human preparations, no other commonly used opioid analgesics in veterinary medicine is readily available in the market for veterinary use except the practitioner places a special order for them from outside the country (personal observation). The study result also showed that lignocaine (site infiltration), xylazine and ketamine were drugs used for various procedures for provision of

Table 3. Assessment of criteria for pain recognition/evaluation.

S/N	Statements	No response (%)	Strongly agree (%)	Agree (%)	Disagree (%)	Strongly disagree (%)	$\bar{x}$	SD
1	Animals' attitude	2 (3)	56 (80)	12 (17)	0 (0)	0 (0)	3.71	0.75
2	Information by care giver	6 (9)	16 (23)	40 (57)	6 (9)	2 (3)	3.26	3.77
3	Animals' response to palpation of painful part	1 (1)	59 (84)	10 (14)	0 (0)	0 (0)	3.80	0.58
4	Inappetence	3 (4)	20 (29)	31 (44)	14 (20)	2 (3)	2.90	0.96

SD, Standard deviation.

Table 4. Determinants of choice of analgesic .

S/N	Factor	Dogs					Cats				
		No Response (%)	SA (%)	A (%)	D (%)	SD (%)	No Response (%)	SA (%)	A (%)	D (%)	SD (%)
1	Availability	0 (0)	35 (50)	30 (43)	1(1)	4 (6)	39 (56)	14 (20)	16 (23)	1 (1)	0 (0)
2	Cost	1 (1)	18 (26)	39 (56)	5 (7)	7 (10)	39 (56)	9 (13)	17 (24)	4 (6)	1 (1)
3	Side effect	4 (6)	27 (39)	33 (47)	2 (3)	4 (6)	38 (54)	13 (19)	16 (23)	1 (1)	2 (3)
4	Potential for toxicity	3 (4)	32 (46)	34 (49)	0 (0)	1 (1)	41 (59)	15 (21)	12 (17)	0 (0)	2 (3)
5	Difficulty in getting exact dose	4 (6)	4 (6)	22 (31)	16 (23)	24 (34)	38 (54)	5 (7)	9 (13)	11 (16)	7 (10)
6	Record keeping requirements	10 (14)	5 (7)	19 (27)	15 (21)	21 (30)	40 (57)	4 (6)	11 (16)	7 (10)	8 (11)
7	Causation of sedation	8 (11)	15 (21)	31 (44)	7 (10)	9 (13)	40 (57)	4 (6)	19 (27)	2 (3)	5 (7)
8	Analgesic efficacy	1 (1)	38 (54)	31 (45)	0 (0)	0 (0)	40 (57)	15 (21)	14 (20)	1 (1)	0 (0)
9	Availability of information on the drug	9 (13)	27 (39)	26 (37)	1 (1)	7 (10)	42 (60)	14 (20)	11 (16)	2 (3)	1 (1)

SA, Strongly agree; A, agree; disagree; SD, strongly disagree.

analgesia by the respondents. The frequent usage of lignocaine and xylazine reported here is contrary to results from a survey in Canada where a low usage of local anaesthetics and alpha-2 agonists was observed (Hewson et al., 2006). However, both local anaesthetics and alpha-2 agonists are powerful adjuncts in perioperative pain management (Pascoe, 2000; Lemke and Dawson, 2000; Lemke, 2004), and the low prevalence of their usage in the Canada survey was one of the reasons given for inadequate analgesia provision by veterinarians in that survey (Hewson et al., 2006).

Only very few respondents filled the option of additional analgesia with any other agent which may be due to unavailability of analgesics packaged for veterinary use (personal observation). With the exception of tramadol and pentazocine no other commonly used opioids or nonsteroidal anti-inflammatory drugs (NSAIDs) for veterinary medicine is readily available in the country (personal observation) as earlier mentioned. It may also be that practitioners feel that there is adequate analgesia provision since the xylazine, ketamine and lignocaine all possess analgesic properties. This situation is similar to what was reported in a survey in South Africa (Joubert, 2001) where a high number of the respondents did not include any drugs specifically for their analgesic properties in the premedication and induction of cats (83.6%) and dogs (80.75%) undergoing routine sterilization. However, when the author included premedication and induction

Table 5. Analgesic type enquiry.

S/N	Procedure	Ketamine (%)	Xylazine (%)	Site infiltration with lignocaine (%)	Epidural block with lignocaine (%)	Epidural with bupivacaine (%)	Diclofenac (%)	None (%)	Others (specify) (%)
1	Aural haematoma (surgical repair)	16 (23)	14 (20)	32 (46)	0 (0)	0 (0)	3 (4)	4(6)	1 (1)
2	Wound repair (stitching)	12 (17)	14 (20)	36 (51)	0 (0)	0 (0)	3 (4)	4(6)	1 (1)
3	Wound debridement (burn wounds)	7 (10)	10 (14)	31 (44)	1 (1)	0 (0)	7 (10)	13 (19)	1 (1)
4	Cherry eye repair	21 (30)	22 (31)	6 (9)	1 (1)	1 (1)	5 (7)	12 (17)	2 (3)
5	Skin tumour excision	13 (19)	23 (33)	21 (30)	1 (1)	0 (0)	3 (4)	8 (11)	1 (1)
6	CS	21 (30)	15 (21)	5 (7)	15 (21)	3 (4)	3 (4)	7 (10)	1 (1)
7	Laparatomy	19 (27)	21 (30)	7 (10)	11 (16)	2 (3)	3 (4)	6 (9)	1 (1)
8	Fractures	20 (29)	22 (31)	7 (10)	4 (6)	1 (1)	5 (7)	9 (13)	2 (3)
9	Mastectomy	18 (26)	14 (20)	14 (20)	9 (13)	0 (0)	2 (3)	12 (17)	1 (1)
10	Ovariohysterectomy	19 (27)	21 (30)	5 (7)	11 (16)	2 (3)	4 (6)	7(10)	1 (1)
11	Dental procedures	11 (16)	18 (26)	20 (29)	4 (6)	0 (0)	8 (11)	8 (11)	1 (1)
12	Orchiectomy	12 (17)	14 (20)	32 (46)	3 (4)	0 (0)	3 (4)	5(7)	1 (1)

Table 6. Assessment of Source of knowledge about recognition and treatment of pain.

S/N	Knowledge source	No response (%)	Strongly agree (%)	Agree (%)	Disagree (%)	Strongly disagree (%)	$\bar{x}$	SD
1	Experience from practice	2 (3)	56 (80)	12 (17)	0 (0)	0 (0)	3.81	0.39
2	Internet	6 (9)	16 (23)	40 (57)	6 (9)	2 (3)	2.76	1.00
3	Drug leaflet	1 (1)	59 (84)	10 (14)	0 (0)	0 (0)	2.84	1.03
4	Literature	3 (4)	20 (29)	31 (44)	14 (20)	2 (3)	3.06	1.01

SD, Standard deviation.

agents with analgesic properties, this percentage was reduced to 34.2%. The author concluded that a large number of practitioners were unaware of the pharmacology of many of the drugs. Nevertheless, in order to provide optimal analgesia making the animal feel more comfortable a multimodal approach of analgesia should be employed (Lascelles et al., 1994; Lundeberg, 1995; Mathews et al., 2014).

A few practitioners in this study use diclofenac for analgesia provision (Table 5). Multimodal analgesia involves the combining of different classes of analgesic drugs that allows the veterinarian to optimize the management of pain, while limiting the occurrence of side effects. Drugs most commonly used in multimodal analgesia include opioids, NSAIDs, local anaesthetics, NMDA antagonists and alpha 2 adrenoceptor agonists. Furthermore, the lack of indication of any other analgesic agent by most of the respondents suggests that they do not consider post-operative analgesia provision highly necessary otherwise it may be that they think the analgesia provided by the most frequently used drugs after the lignocaine, that is, ketamine and xylazine are adequate. Indeed, alpha 2-adrenergic agonists are known to have potent analgesic

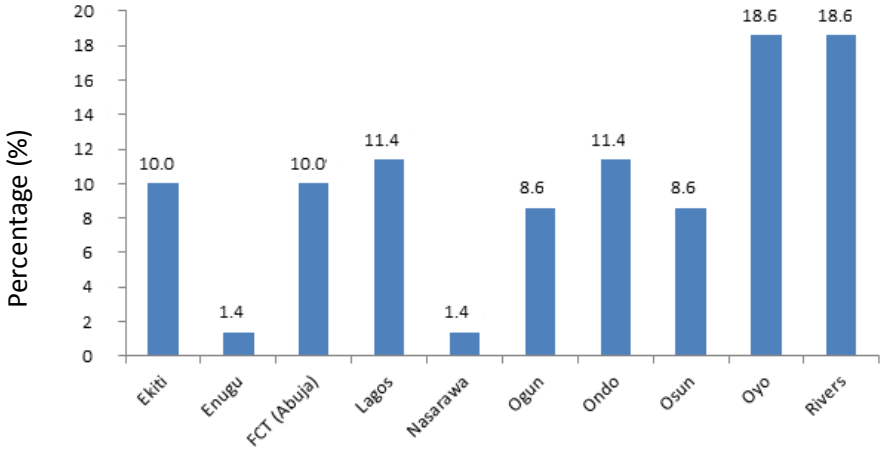

Figure 1. Percentage distribution of surveyed respondents per state.

properties (Paddleford and Harvey, 1999; Clarke et al., 2001) and sub anaesthetic doses of ketamine given pre-operatively have been shown to be effective in reducing post-operative pain (Slingsby and Waterman-Pearson, 2000).

Nevertheless, the analgesic effect of alpha 2 adrenergic agonists does not last as long as the sedative effect (Paddleford and Harvey, 1999), therefore xylazine does not contribute much to post-operative analgesia (Lascelles et al., 1994).

Conclusion

A substantial number of the veterinarians surveyed are well informed about animal pain perception, and use anaesthetic protocols that provide analgesia. Nonetheless, some of them still hold on to the misconception that minimal pain perception is beneficial to the patient at the post-operative period which may have influenced their non-provision of additional analgesia post-operatively.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Bell A, Helm J, Reid J (2014). Veterinarians' attitudes to chronic pain in dogs. Vet. Rec. 175(17):428.

Brearley JC (2003). Veterinary Analgesia: State of the art. Domenica Giugno 1(1):22. Available at: http://www.isvra.org/PDF/VRA/Brearley%20JC%20-%20Veterinary%20analgesia%20state%20of%20the%20art.pdf

Capner CA, Lascelles BD, Waterman-Pearson AE (1999). Current British veterinary attitudes to perioperative analgesia for dogs. Vet. Rec. 145(4):95-99.

Dohoo SE, Dohoo IR (1996a). Postoperative use of analgesics in dogs and cats by Canadian veterinarians. Can. Vet. J. 37: 546-551.

Dohoo SE, Dohoo IR (1996b). Factors influencing the postoperative use of analgesics in dogs and cats by Canadian veterinarians. Can. J. 37(9):552.

Epstein M, Rodan I, Griffenhagen G, Kadrlik J, Petty M, Robertson S (2015). 2015 AAHA/AAFP pain management guidelines for dogs and cats. J. Feline Med. Surg. 17(3):251-272.

Eyarefe OD, Oguntoye CO (2016). Honey, an unexplored topical wound dressing agent in Nigerian veterinary practice. Sokoto J. Vet. Sci. 14(3):8-17.

Eyarefe OD, Oyetayo NS (2016). Prevalence and pattern of small animal orthopaedic conditions at the Veterinary Teaching Hospital, University of Ibadan. Sokoto J. Vet. Sci. 14(2):8-15.

Flecknell P (2008). Analgesia from a veterinary perspective. Brit. J. Anaesth. 101(1):121-124.

Fox SM (2014). Pain Assessment in Small Animal Medicine in Textbook of Pain Management in Small Animal Medicine, CRC Press, USA. pp 32-33.

Clarke KW, Trim CM, Hall LW (2014). Principles of sedation, anticholinergic agents, and principles of premedication. Vet. Anaesth. 79-100.

Hansen B, Hardie E (1993). Prescription and use of analgesics in dogs and cats in a veterinary teaching hospital: 258 cases (1983-1989). J. Am. Vet. Med. Assoc. 202(9):1485-1494.

Hewson CJ, Dohoo IR, Lemke KA (2006). Perioperative use of analgesics in dogs and cats by Canadian veterinarians in 2001. Can. Vet. J. 47(4):352.

Hugonnard M, Leblond A, Keroack A, Cadore JL, Troncy E(2004). Attitudes and concerns of French veterinarians towards pain and analgesia in dogs and cats. Vet. Anaesth. Analg. 31:154-163.

Joubert KE (2001). The use of analgesic drugs by South African veterinarians: continuing education. J. South Afr. Vet. Assoc. 72(1):57-60.

Joubert KE (2006). Anaesthesia and analgesia for dogs and cats in South Africa undergoing sterilisation and with osteoarthritis-an update from 2000: report. J. South Afr. Vet. Assoc. 77(4):224-228.

Lascelles BDX, Butterworth SJ, Waterman AE (1994). Postoperative analgesic and sedative effects of carprofen and pethidine in dogs. Vet. Rec. 134(8):187-191.

Lemke KA (2004). Perioperative use of selective alpha-2 agonists and antagonists in small animals. Can. Vet. J. 45(6):475.

Lemke KA, Dawson SD (2000). Local and regional anesthesia. Veterinary Clinics: Small Anim. Pract. 30(4):839-857.

Lorena ERS, Luna PL, Lascelles XD, Corrente JE (2014). Current attitudes regarding the use of perioperative analgesics in dogs and cats by Brazilian veterinarians. Vet. Anaesth. Analg. 41:82-89.

Lundeberg T (1995). Pain physiology and principles of treatment. Scandinavian J. Rehabilitation Med. Suppl. 32:13-41.

Mathews KA (2000). Pain assessment and general approach to management. Veterinary Clinics of North America: Small Anim. Pract. 30(4):729-755..

Mathews K, Kronen PW, Lascelles D, Nolan A, Robertson S, Steagall PV, Wright B, Yamashita K (2014). Guidelines for recognition, assessment and treatment of pain. J. Small Anim. Pract. 55(6).

Paddleford RR, Harvey RC (1999). Alpha2 agonists and antagonists. Veterinary Clinics of North America: Small Anim. Pract. 29(3):737-745.

Pascoe PJ (2000). Perioperative pain management. Veterinary Clinics: Small Anim. Pract. 30(4):917-932

Raekallio M, Heinonen KM, Kuussaari J, Vainio O (2003). Pain alleviation in animals: attitudes and practices of Finnish veterinarians. Vet. J. 165(2): 131-135.

Slingsby LS**,** Waterman-Pearson AE (2000). The post-operative analgesic effects of ketamine after canine ovariohysterectomy-a comparison between pre-or post-operative administration. Res. Vet. Sci. 69(2):147-152.

Watson AD, Nicholson A, Church DB, Pearson MR (1996). Use of anti-inflammatory and analgesic drugs in dogs and cats. Australian Vet. J. 74(3):203-210.

Weber GH, Morton JM, Keates H (2012). Postoperative pain and perioperative analgesic administration in dogs: practices, attitudes and beliefs of Queensland veterinarians. Australian Vet. J. 90(5):186-193.

Williams VM, Lascelles BD, Robson MC (2005). Current attitudes to, and use of, peri-operative analgesia in dogs and cats by veterinarians in New Zealand. New Zealand Vet. J. 53(3):193-202.

Zaki S (2013). Pain Assessment and Management in Companion Animals Veterinary Update. Boardtalk Insert 1:1-8.

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Full Length Research Paper

Clinical survey on major ruminant diseases in Kola Tembein and Tanqua Abergelle Districts, Central Zone of Tigray, Northern Ethiopia

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Diseases are the major detriment in ruminant production and productivity in the study districts. A cross sectional study was conducted to assess the major animal health constraints of ruminants. 461 species of sick ruminants were examined and diagnosed tentatively. Similarly, samples were collected and identified in the laboratory for confirmation of the cases. Of the clinically identified ruminant diseases, sheep and goat pox (11.93%), abortion (8.24%), pasteurellosis (8.46%), lice infestation (9.98%), tick infestation (5.86%), and flea infestation (5.21%) accounted for higher values. The proportion of infectious, non-infectious, ectoparasitic infestation, and reproductive diseases among clinically sick ruminants was 51.63, 9.97, 26.25, and 12.15%, respectively. The higher ectoparasitic infestation in the study district was lice infestation (38.02%) followed by tick (22.31%), flea (19.83%), mange mite (11.57%), and leech infestation (8.26%). The reproductive problems encountered were abortion (67.86%), retained placenta (25%), and dystocia (7.14%). The most prevalent infectious diseases encountered were sheep and goat pox (23.11), pastuerellosis (16.39), gastrointestinal tract parasitism (13.03), and anthrax (6.30). The most encountered non-infectious diseases were abscess (28.26) and bloat (17.39). In conclusion, infectious diseases and external parasites cause serious economic loss in the study districts. So, regular surveillance of animal disease coupled with vaccination of animals with available vaccines, regular spraying of acaricides and more importantly, public awareness in prevention and control of major livestock diseases in the districts is recommended.

Key words: Clinical survey, Kola Tembien, ruminants, Tanqua Abergelle.

INTRODUCTION

Ethiopia has the largest livestock population in Africa which is estimated to be 54 million cattle, 29.33 million sheep, 24.06 million goats, 1.78 million horses, 5.57 million donkeys, 380 thousand mules, 1 million camels,

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39.6 million chicken, and 4.7 million beehives (Central Statistical Agency (CSA), 2015). The majority of the livestock populations are local breeds, which are found in rural areas under subsistence type of farming system and the remaining are hybrid and exotic breeds (CSA, 2015). The livestock subsector has an enormous contribution to Ethiopian national economy and livelihoods of many Ethiopians. It contributes about 16.5% of national gross domestic product (GDP) and 35.6% of the agricultural GDP. It also contributes 15% export earnings and 30% of agricultural employment (Leta and Mesele, 2014). Despite huge livestock population and existing favorable environmental conditions, the current livestock output of the country is little. This is associated with a number of factors. Of these factors, disease is a major challenge in the livestock production and productivity (Negassa et al., 2011). In Ethiopia, the aggregate annual economic losses from animal diseases through direct mortality and reduced productive and reproductive performance were estimated at US$150 million (Berhanu, 2002).

The study district favors the development and propagation of infectious agents which makes it difficult to resist the annoying effect of these parasites on the host and makes the control of disease difficult (Singla 1995; Singh et al., 2000). However, as the major predisposing factors and enormous economic losses caused by disease, detailed studies on their prevalence and distribution is required. So far limited efforts have been made to investigate an overall situation of ruminant disease in Aberegele Research Center mandate areas. Therefore, the objective of this study was to have baseline information on ruminant disease and to determine the prevalence of major ruminant diseases.

MATERIALS AND METHODS

Description of the study areas

The study was conducted in Kola Tembien and Tanqua Abergele districts for disease investigation and sample collection.

The study districts were categorized as hot to warm sub-moist lowlands (SM1-4) sub-agro ecological zone of the region with an altitude of 1300 to 1500 m above sea level and the mean annual rainfall ranging from 400 to 600 mm which is characterized by low, erratic, and variable rainfall. The annual temperature ranges from 28 to 42°C (Bureau of Agricultural and Rural Development of Woreda Tanqua Abergelle and Woreda Kola Tembien, 2015) (Figure 1).

Clinical disease survey

Throughout the research period, any ruminant disease either in a form of outbreak or individual cases was vigorously investigated so as to arrive at tentative disease diagnosis.

Study design and animals

A cross-sectional study design was conducted from July 2012 to June 2013 on the survey of major ruminant disease on 461 heads of ruminants consisting of different age groups, sex, breed, body condition scoring, and production systems. The animals include those coming to veterinary open air clinics, animals belonging to small holder dairy farms, and animals in the field. Tentative diagnosis was made based on history of illness and clinical examination. Samples were also taken to Abergelle Agricultural Research Center Laboratory and were examined immediately. For this study, a total of 461 clinical cases coming to veterinary clinics were thoroughly and purposively investigated for cause of abnormalities or dysfunction.

Data analysis

All data recorded were entered into Microsoft Excel and subsequently analyzed using Stata version 11 computer program. Descriptive statistics was used to know the frequency of the disease in the study area.

RESULTS

Various age group, breed and species of animals were brought to clinics seeking for veterinary service. Thirty ruminant diseases were identified in districts of Tanqua Abergelle and Kola Tembien from 461 clinical sick animals which were presented to Yechila and Abi Adi veterinary open air clinics. All these clinical cases were examined based on the history of the patient and general and systemic clinical examination, and laboratory examination protocols so as to arrive at tentative diagnosis. Table 1 shows the percentile and relative frequencies of these diseases.

Of the 30 clinically identified ruminant diseases, sheep and goat pox, abortion, pasturellosis, lice infestation, tick infestation and flea infestation accounted for the higher values in both districts with relative percentile of 11.93, 8.24, 8.46, 9.98, 5.86, and 5.21%, respectively.

Proportion of disease categories in Tanqua Abergele and Kola Tembien

Based on the nature and cause of illness, the diseases were categorized as infectious, non-infectious, ectoparasitic infestation, and reproductive diseases. Diseases such as anthrax, black leg, sheep and goat pox, contagious ecthyma (Orf), actinobacillosis, actinomycosis, colibacillosis, mastitis, pasturelosis, parasitic bronchitis, gastrointestinal tract parasitism, Peste desPetitis Ruminants, foot root, and kerato conjuctivitis were grouped as infectious. Tick infestation, lice infestation, flea infestation, mange mite infestation and leech infestation were grouped as ectoparasitic infestation. Bloat, milk fever, trauma of eye, fracture of limbs and horn, wart, abscess and incisional hernia were grouped under disease category of non-infectious whereas abortion, retained placenta and dystocia were also grouped under reproductive problems category.

The proportion of infectious, non-infectious,

Table 1. The prevalence of major ruminant diseases in Tanqua Abergelle and Kola Tembien districts.

Tentative diagnosis	Frequency	Percent
GIT Parasitism	31	6.72
PPR	5	1.08
Abortion	38	8.24
Abscess	13	2.82
Actinobacillosis	8	1.74
Actinomycosis	9	1.95
Anthrax	15	3.25
Black leg	8	1.74
Bloat	8	1.74
Colibacillosis	7	1.52
Dystocia	4	0.87
Flea infestation	24	5.21
Foot rot	3	0.65
Fracture of horn	1	0.22
Fracture of limb	4	0.87
Incisional hernia	4	0.87
Keratoconjunctivitis	15	3.25
Leech infestation	10	2.17
Lice infestation	46	9.98
Mange mite infection	14	3.04
Mastitis	11	2.39
Milk fever	3	0.65
Orf	17	3.69
Parasitic bronchitis	15	3.25
Pastuerellosis	39	8.46
Sheep and goat pox	55	11.93
Retained placenta	14	3.04
Tick infestation	27	5.86
Trauma of eye	7	1.52
Wart	6	1.30

ectoparasitic infestation and reproductive diseases in both district were 51.63, 9.97, 26.25, and 12.15%, respectively. Of these, infectious and ectoparasitic infestation accounted for higher proportion as compared to reproductive and non-infectious diseases.

The status of external parasite infestation in the study districts

The overall prevalence of ectoparasite infestation in the study districts was 26.25% (121/461). The ectoparasite infestation disease category includes lice, tick, flea, mange mite, and leech infestation and their prevalence is shown in Table 2.

Higher infestation was found in lice (38.02%) and followed by tick (22.31%), flea (19.83%), mange mite (11.57%) and leech infestation (8.26%) in the study districts.

The status of reproductive problems in the study districts

The overall prevalence of reproductive problem categories in districts of Tanqua Abergelle and Kola Tembien was 12.15%. The reproductive problem category comprises of abortion, retained placenta and dystocia with their prevalence of 67.86, 25, and 7.14%, respectively. The higher proportions of reproductive diseases were abortion (Table 3).

The prevalence of infectious diseases in the study districts

The overall prevalence of infectious disease categories in

Table 2. The status of external parasite infestation in the districts of Tanqua Abergele and Kola Tembein.

Type of parasite	Frequency	Percent
Lice infestation	46	38.02
Tick infestation	27	22.31
Flea infestation	24	19.83
Mange mite infestation	14	11.57
Leech infestation	10	8.26

Table 3. The prevalence of reproductive disease in the study area.

Disease category	Tanqua Abergelle (%)	Kola Tembien (%)	Total (%)
Retained placenta	17.86	7.14	25
Abortion	66.07	1.79	67.86
Dystocia	5.36	1.79	7.14
Total	89.29	10.71	100

Table 4. The status of prevalence of infectious disease in districts of Tanqua Abergele and Kola Tembien.

Infectious disease	Frequency	Percent
Anthrax	15	6.30
Black leg	8	3.36
Actinomycosis	9	3.78
Actinobacilosis	8	3.36
Mastitis	11	4.62
GIT parasitism	31	13.03
Sheep and goat pox	55	23.11
Orf	17	7.14
Colibacillosis	7	2.94
Kerato conjunctivitis	15	6.30
Foot rot	3	1.26
PPR	5	2.10
Pasturellosis	39	16.39
Parasitic bronchitis	15	6.30
Total	238	100.00

the study districts were 51.63% which is the leading among the disease category and exerts major effect on the livestock industry. Pasturellosis, gastrointestinal parasitism, parasitic bronchitis and sheep and goat pox was the leading prevailing infectious disease among the infectious disease category in the study districts (Table 4).

The prevalence of non-infectious disease in the study districts

The overall prevalence of non-infectious disease in both districts is 9.97% which is the least among disease category. Of all the non-infectious disease in the study districts, bloat has higher percentage followed by trauma of eye due to whip lash (Table 5).

DISCUSSION

The study reveals that sheep and goat pox, abortion, pasteurellosis, lice infestation, tick infestation and flea infestation were the major animal health constraints of ruminants in the study districts. This study agrees with the finding of Haftu et al. (2014) in which pasteurellosis and ectoparasite infestation were the major health constraints in Ganta Afeshum district.

Table 5. The status of non-infectious diseases in the study districts.

List of abnormalities	Frequency	Percent
Bloat	8	17.39
Trauma of eye	7	15.22
Fracture of horn	1	2.17
Incisional hernia	4	8.70
Wart	6	13.04
Milk fever	3	6.52
Abscess	13	28.26
Fracture of limbs	4	8.70
Total	46	100

Figure 1. Topographic map of Tanqua Abergele and Kola Tembien.

The overall prevalence of ectoparasites in the study districts was 26.25%. However, it is higher than the study conducted in Ganta Afeshum district (15.4%) reported by Haftu et al. (2014) and it is lower than the study conducted in Gondar (78.38%) reported by Fentahun et al. (2012). These variations might be due to different management practice of the animals, agro ecology, and ectoparasite control practices in the different study districts.

The major infectious diseases of small ruminants identified in this study were pastuerellosis, gastrointestinal tract parasitism, parasitic bronchitis and sheep and goat pox. These diseases were also identified in different areas of the country like Urgessa et al. (2012) who reported the existence of these diseases in Ilu Abba Bora Zone of Oromia Regional State, in Ganta Afeshum district of Eastern Zone of Tigray (Haftu et al., 2014).

The major reproductive problems identified in these study districts were abortion (67.8%), retained placenta (25%), and dystocia (7.14%). The present findings revealed the existence of small ruminant abortion and retained placenta at a high prevalence. The present finding with regards to abortion was higher than the report in Dire Dawa (51.02%) by Negash et al. (2012). This report was also higher than the report by Fentahun and Fresebehat, (2012) in Gonder areas (15%). The present finding also revealed higher prevalence of retained placenta and dystocia. This report also disagrees with those of Feleke (2008) who reported higher prevalence (25%) of retained fetal membrane and very low prevalence of dystocia (0.3%) was reported in Bure districts. In the present study, the higher prevalence of abortion, retained placenta and dystocia might be associated with infectious and non-infectious causes. Similarly, this may also be due to different management factors and agro ecology (Juyal et al., 2011). Most researches on reproductive problems especially abortion put as a serious constraint small ruminant production,

because this causes high mortality amongst kids and lambs and it has a high zoonotic potential (Gizaw et al., 1995; Gojam et al., 1995; Solomon and Gemeda, 2000; Tibbo, 2006).

The overall investigated infectious diseases in ruminants in the study districts were anthrax (6.3%), blackleg (3.36%), actinomycosis (3.78%), actinobacillosis (3.36%), mastitis (4.62%), gastrointestinal tract parasitism (13.03%), sheep and goat pox (23.11%), Orf (7.14%), colibacillosis (2.94%), keratoconjunctivitis (6.3%), foot rot (11.26%), and pastuerellosis (16.39%). Different reports were described about infectious diseases of ruminants in different parts of Ethiopia; in Ganta Afeshum reported by Haftu et al. (2014) for anthrax (6.8%), blackleg (5.8%), pastuerellosis (15.9%), and gastrointestinal tract parasitism (16.1%). Amsalu (2007), Mekonnen (2007), Yohannes (2007) and Abraha (2007) also reported the importance of anthrax and blackleg.

The present study showed that pasteurellosis was the most serious economically important bacterial infectious disease of ruminants in the study districts. This result is in agreement with the findings of Haftu et al. (2014) who reported the prevalence in Ganta Afeshum to be 15.9%. Pasteurellosis being commensally of the upper respiratory tract selectively proliferate and colonize the lower part of the respiratory tract. This occurs during the times of ill-defined factors of which inclement weather is one example (Radostits et al., 2006). Similarly, the high occurrence of the diseases in the study districts may be due to stress factors.

Sheep/goat poxviruses in the present study were found to be frequently occurring viral infectious diseases in the districts. Factors predisposing for poxvirus infection include climate, housing, and shortage of feed during the long dry season. Similar, study was reported by Haffize (2001) in Central Ethiopia. This finding is also in agreement with the finding of Feleke (2008) who studied major animal health problems of market oriented livestock development in Bure district and reported the prevalence of sheep and goat pox in Bure woreda to be 18.35 and 31.25%, respectively.

In the study districts, different non infectious diseases were investigated. Among these non-infectious diseases, bloat was at higher prevalence rate (17.39%). The present finding was different from the report of Haftu et al. (2014) who reported that the prevalence was 4.7%; this may be due to agro ecology and management difference. In addition to this, Feleke (2008) also reported that eye trauma was investigated; although it was in a low prevalence (0.3%).

CONCLUSIONS AND RECOMMENDATION

In the study districts, health problems such as sheep and goat pox, abortion, pasturellosis, lice infestation, tick infestation and flea infestation were the major identified health problem of ruminants. Other diseases of economic importance included black leg, mastitis; peste des petits ruminants (PPR) and anthrax were also identified. Based on these findings, the following recommendations are made:

(1) Provision of adequate budget for procurement of drugs and veterinary equipment may be made.
(2) Identification of strains of different diseases in the district is needed.
(3) Provision of regular in-service training to animal health workers in the district is required.
(4) Training farmers and extension agents in prevention and control of major livestock diseases in the district may be stressed.
(5) Provision of regular vaccinations and treatment of major livestock diseases in the district is recommended.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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REFERENCES

Abraha GG (2007). Major animal health problems of market oriented livestock development in Atsbi Womberta woreda, Tigray Regional State (Doctoral dissertation, Addis Ababa University).

Amsalu K (2007). Major animal health problems of market oriented livestock development in Fogera woreda (Doctoral dissertation, Addis Ababa University) Ethiopia.

Berhanu A (2002, June). Welcome address: Animal health and poverty reduction strategies. In Proceedings of the 16th Annual Conference of the Ethiopian Veterinary Association (EVA), held. 56:117-137.

Central Statistical Agency (CSA) (2015). Central statistics for livestock population in Ethiopia, Addis Ababa, Ethiopia.

Feleke A (2008).Major animal health problems of market oriented livestock development in Bure woreda (Doctoral dissertation, Haramaya University).

Fentahun T, Fresebehat A (2012). Listeriosis in Small Ruminants: A Review. Adv. Biol. Res. 6(6):202-209.

Fentahun T, Woldemariam F, Chanie M, Berhan M (2012). Prevalence of ectoparasites on small ruminants in and around Gondar Town. American-Eurasian J. Sci. Res. 7(3):106-111.

Gizaw S, Abegaz S, Gojam Y (1995). Factors affecting preweaning survival of Horro lambs at Bako Research Center. In 3. National Conference of the Ethiopian Society of Animal Production, Addis Abeba (Ethiopia), 27-29 Apr 1995. ESAP.

Gojam Y, Gizaw S, Thwaites CJ, Awgichew K (1995). Influence of birth weight and postpartum age on lamb mortality in Ethiopian Horro sheep. In 3. National Conference of the Ethiopian Society of Animal Production, Addis Abeba (Ethiopia), 27-29 Apr 1995. ESAP.

Haffize M (2001). Study on skin diseases of small ruminants in central Ethiopia. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, DebrezeZeit, Ethiopia.

Haftu B, Asresie A, Haylom M (2014). Assessment on Major Health

Constraints of Livestock Development in Eastern Zone of Tigray: The Case of “Gantaafeshum Woreda” Northern Ethiopia. J. Vet. Sci. Technol. 5:174.
Juyal PD, Bal MS, Singla LD (2011) Economic impact, diagnostic investigations and management of protozoal abortions in farm animals. In: All India SMVS’ Dairy Business Directory 11:39-46.
Leta S, Mesele F (2014). Spatial analysis of cattle and shoat population in Ethiopia: growth trend, distribution and market access. Springer plus. 3(1): 310.
Mekonnen K (2007). Major animal health problems of market oriented livestock development in Alaba woreda, Southern Nations Nationalities and Peoples Region (Doctoral dissertation, Addis Ababa University), Ethiopia.
Negash E, Shimelis, Desta B (2012). Seroprevalence of small ruminant brucellosis and its public health awareness in selected sites of Dire Dawa region, Eastern Ethiopia. J. Vet. Med. Anim. Health 4(4):61-66.
Negassa A, Rashid S, Gebremedhin B (2011). Livestock Production and Marketing. ESSP II Working Paper 26. International Food Policy Research Institute/ Ethiopia Strategy Support Program II, Addis Ababa, Ethiopia.
Radostits OM, Gay CC, Hinchcliff KW, Constable PD (Eds.) (2006). Veterinary Medicine E-Book: A textbook of the diseases of cattle, horses, sheep, pigs and goats. Elsevier Health Sciences.
Singh AP, Singla LD, Singh A (2000) A study on the effects of macroclimatic factors on the seasonal population dynamics of *Boophilus micropus* (Canes, 1888) infesting the cross-bred cattle of Ludhiana district. Int. J. Anim. Sci. 15(1):29-31.
Singla LD (1995) A note on sub-clinical gastro-intestinal parasitism in sheep and goats in Ludhiana and Faridkot districts of Punjab. Indian Vet. Med. J. 19:61-62.
Solomon A, Gemeda D (2000). Genetic and phenotypic parameters of growth, reproductive and survival performance of Horro sheep at Bako Research Center. Research fellowship report. International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia.
Tibbo M (2006). Productivity and health of indigenous sheep breeds and crossbreds in the central Ethiopian highlands. P 51.
Urgessa D, Duguma B, Demeka S, Tolamariam T (2012). A survey of sheep and goat diseases in Ilu Abba Bora Zone of Oromia Regional State, Southwestern Ethiopia. Glob. Vet. 9 (5):552-556.
Yohannes T (2007). Major animal health problems of market oriented livestock development in Alamata Woreda. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa Universty, Debre Zeit, Ethiopia.

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Full Length Research Paper

Tick resistance of two breeds of cattle in Wolaita Zone, Southern Ethiopia

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The objective of this study was to evaluate total tick burden and resistance differences of local indigenous breeds and Holstein-crosses (50%). Longitudinal study method was employed to assess the mean monthly half-body regions of total tick burdens. The mean monthly half body regions of total tick count on local indigenous cattle and Holstein-crosses (50%) were 75.2 and 201.7, respectively. The monthly mean half-body region of total tick count on the Holstein-crosses (50%) was significantly ($p<0.05$) higher than that of the indigenous breed throughout the study months. From 4425 collected adult ticks, *Boophilus decoloratus* (47.50%), *Amblyomma gemma* (21.06%), *Amblyomma variegatum* (18.31%), *Amblyomma cohaerens* (4.97%), *Amblyomma lepidum* (3.75%), *Rhipicephalus evertsi evertsi* (2.87%), *Rhipicephalus muhsamae* (0.79%) and *Rhipicephalus guilhoni* (0.75%) were the tick species identified in descending order. Among the tick species identified, seasonal variation was observed in four species, namely: *A. variegatum*, *A. gemma*, *A. lepidum* and *R. evertsi evertsi*. Animal health extension especially on tick control strategy should be in place in order to improve animal productivity.

Key words: Burden, Holstein-cross (50%), indigenous, resistance tick, Ethiopia.

INTRODUCTION

Ticks are globally important in livestock production, because of their economic and health implications (Jongejan and Uilenberg, 2004). It has been estimated that about 80% of world's cattle are infested with ticks (Minjauw and McLeod, 2003). According to CSA (2010), there are about 723,343 heads of cattle in Wolaita of which 3825 are Holstein-crosses. The total cattle population of Wolaita accounts for 7.46% of the Southern Region. Crossbred cattle are being introduced into Wolaita during the working phase of Wolaita Agricultural Development Unit project as a means of milk production to satisfy the protein demand of the human population. Resistance of cattle to tick infestation was reported to consist of innate and acquired components (Wikel and Whelen, 1986).

According to Utech et al. (1978) high levels of host resistance to ticks are primarily associated with zebu cattle, but a proportion of resistant individuals can occur in all breeds. Hence the objective of this study was to assess total tick burden difference, which is one of an indicator for tick resistance differences, of indigenous and Holstein-crosses (50%) in Kokatie, area.

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MATERIALS AND METHODS

Study area

The study was carried out in Kokatie PA of Sodo-Zuria district, (Figure 1) which is 2083 to 2213 m above sea level, and located between 6°52'01.9" to 6°52'42.6" N and 37°47'06.9" to 37°48'55.3" E. The vegetation of the study area is predominantly eucalyptus tree, natural grasses, tuft of grasses and some bushes. The area is characterized by bimodal rainfall, long rainy period (June to October) and short rainy period (March and April). Moreover, it is one of the areas that are densely populated.

Experimental animals

The experimental animals were selected from two breeds of cattle that were kept under backyard and/or traditional management system. From these, thirty two animals, sixteen indigenous and sixteen Holstein-crosses (50%), were selected through purposively sampling method for this field experimental study. Then the selected animals were grouped into two according to their breed types: Group I indigenous cattle and Group II Holstein-crosses (50%). The study animals were not treated with acaricide throughout the study periods and for about two months before the start of the study.

Study design and methodology

A longitudinal study method was employed in which monthly half-body regions total tick burden were taken regularly for eight consecutive months, August to March. During these eight study months, adult ticks were collected from the animals into universal sample bottles containing 70% ethanol following the procedure described by Okello-Onen et al. (1999). Then samples were transported to Hawassa University Veterinary Medicine Parasitology Laboratory and identified following the standard identification procedures described by Hoogstraal (1956), Okello-Onen et al. (1999) and Walker,(2003). Rainfall, humidity and temperature data of the study months were taken from Sodo meteorological station. The study considered 95% level of significance and 5% desired absolute precision.

Data analysis

The data collected were analyzed by descriptive statistics; and log transformed data were analyzed with t-test and repeated measure of variance using SPSS 16.5 software.

RESULTS

Tick burden

The overall mean half body regions of total tick count on the indigenous and Holstein-crosses (50%) were 75.2 and 201.7, respectively. The trend of mean monthly half-body regions total tick count of the indigenous and Holstein-crosses (50%) are shown on Figure 2. Repeated measure of collected data analysis showed that, there was a significant ($p<0.05$) variation in the mean monthly half-body region of tick burdens between the two breeds of cattle, indigenous and Holstein-crosses (50%) ($F= 370.61$, $P> 0.000$, Partial η squared= 0.925; 95% CI=1.766 to 1.833 for indigenous breed and 2.209 to 2.275 for Holstein-crosses 50%). Within the breeds there was significant ($p<0.05$) variation in the mean monthly tick burden of half-body regions in both breed ($F= 4.585$, $P< 0.001$ and Partial η squared = 0.132), due to the interaction of breeds with months. The seasonal tick burden of half body region on both breeds is shown in Figure 3. The analysis for presence or absence variation in the two breeds of cattle half-body region tick burden is shown in Table 2. Humidity and rainfall had positively influenced ($t = 10.28$, $P = 0.000$; $t = 9.71$, $P = 0.000$) on the half-body regions total tick burden of both breeds (Figure 4), while the temperature had negatively affected ($t = -9.74$, $P = 0.000$) the half-body regions total tick burden of both breeds as shown in figure 5. That is why about 80.76% of the overall total tick burden differences were observed between the study months ($F = 125.95$, $P = 0.000$ and partial η squared = 0.8076).

Tick species identification

A total of 4425 adult ticks were collected from half body regions of the study animals, and a total of three genera of ticks were identified. From the identified genera, a total of eight species of ticks were identified, namely: *B. decoloratus* (47.5%), *A. gemma* (21.1%), *A. variegatum* (18.3%), *A. cohaerens* (5.0%), *A. lepidum* (3.8%), *R. evertsi evertsi* (2.9%), *R. muhsamae* (0.8%) and *R. guilhoni* (0.8%). Among these eight tick species six of them were identified as the major tick species in the study area: *A. variegatum*, *A. gemma*, *A. cohaerens*, *A. lepidum*, *B. decoloratus* and *R. evertsi evertsi* (Table 1).

DISCUSSION

The mean monthly half-body region of total tick count on the Holstein-crosses (50%) was significantly ($p<0.05$) higher than that of the indigenous breed throughout the study months ($F= 370.61$, $P= 0.000$, Partial η squared= 0.925). This variation is clearly shown in Figure 2 that showed the trends of half body region of total tick counts. This finding agreed with Ali and de Castro (1993) who reported that Horro breed carried fewer total tick burdens than Horro X Holstein. Aragaw (1994), Yohualashet et al. (1995) and Solomon and Kaaya (1996) also reported better control of tick burdens in the local zebu than Holstein crosses.

At Abernossa ranch, Arsi breed was found to be highly tick resistant, followed by Boran breed, but Boran X Holstein was the least resistant (Solomon and Kaaya, 1996). Moran et al. (1996) also observed that pure Ankole cattle of Burundi were more resistant than Ankole X Holstein. In this study, mean monthly Log_{10} (x+1) of total tick burden was statistically significant and observed

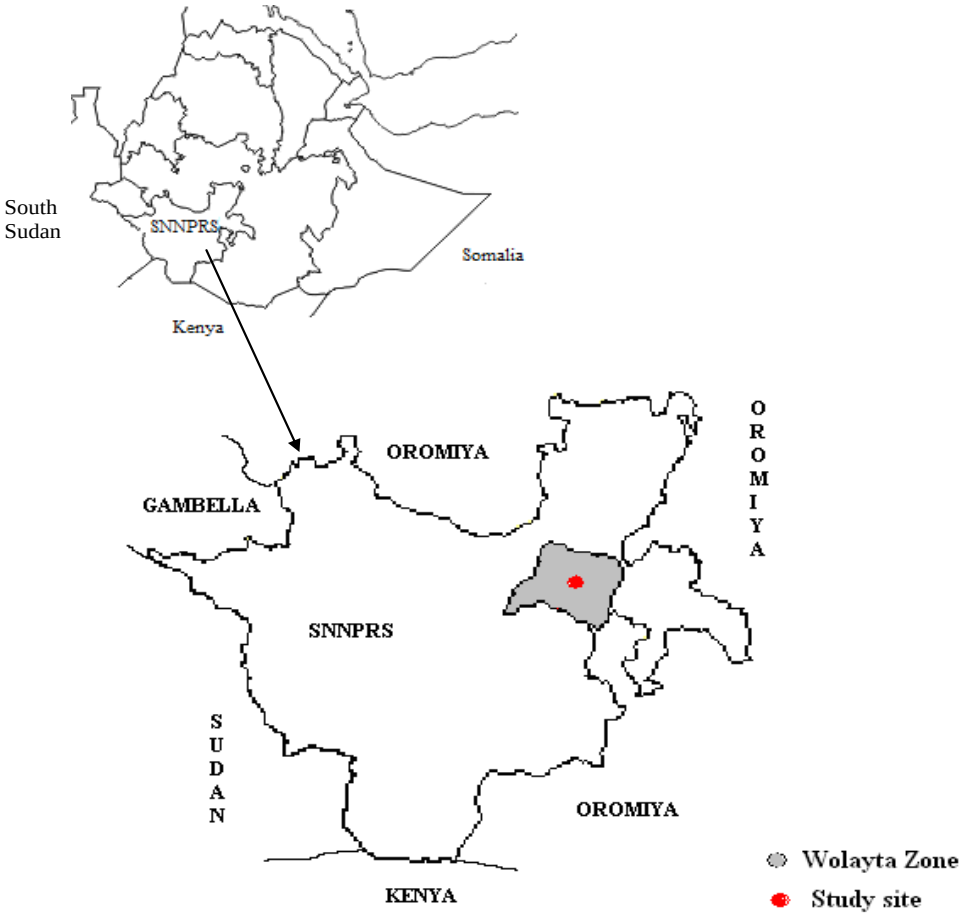

Figure 1. Map of SNNPRS to show the study site

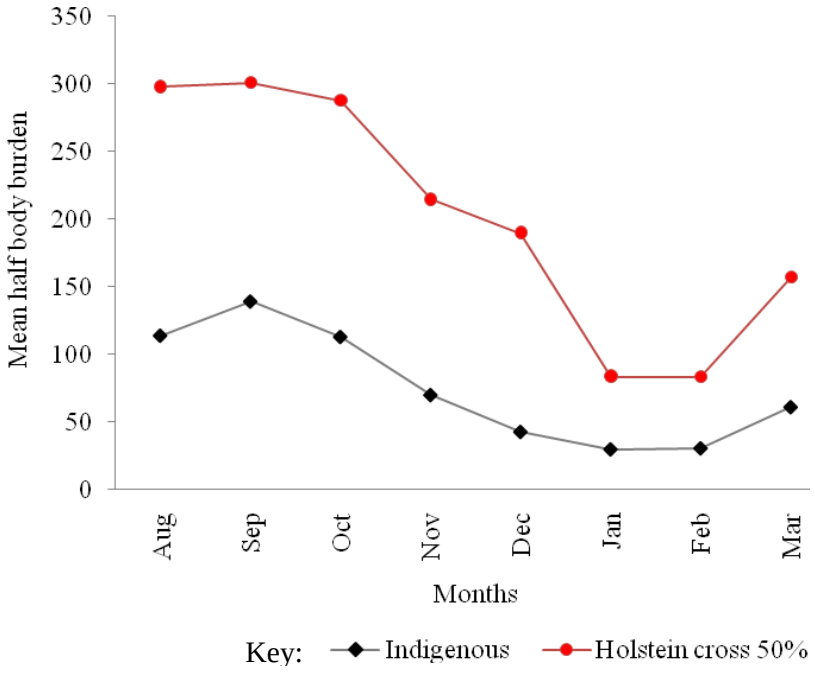

Figure 2. Pattern of mean monthly half-body tick burden of the Indigenous and Holstein crosses 50%.

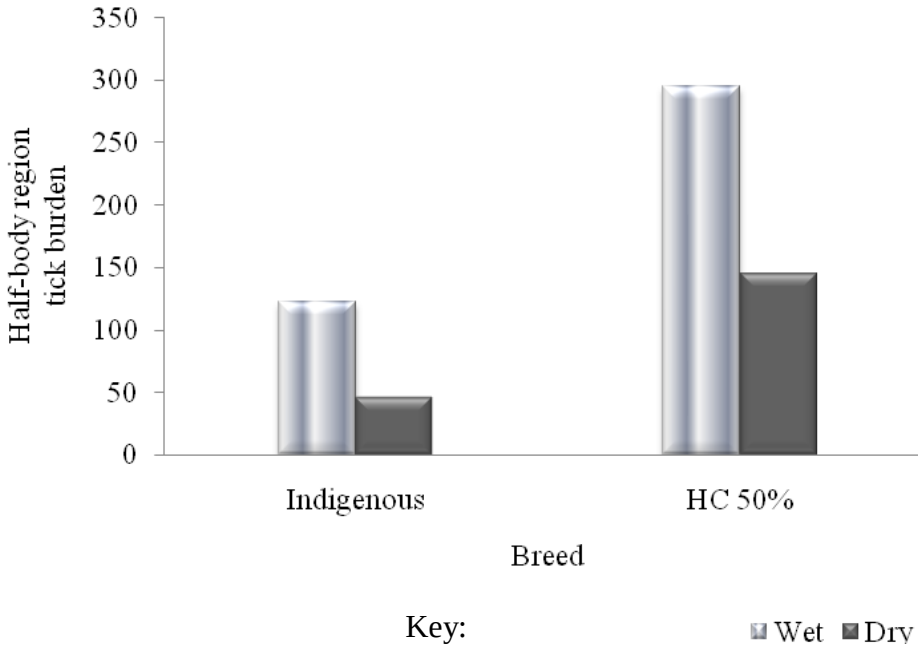

Figure 3. Wet and dry periods mean half-body regions total tick burden of indigenous and Holstein-cross (50%) cattle breed.

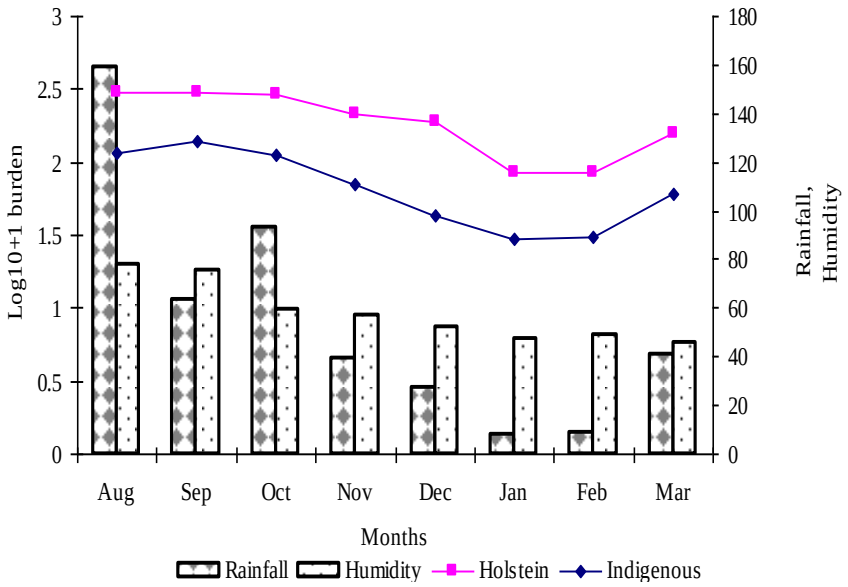

Figure 4. Trends of mean $\log_{10}(X+1)$ half body tick burden of the breeds, rainfall and humidity.

higher in Holstein-crosses (50%) than on the indigenous breed throughout the study months. Even with the various temperatures, rainfall and humidity had no change in the mean half body region tick burden. Gene expression studies strongly indicated that both immune and non-immune mechanisms are associated with tick resistance in cattle (Porto et al., 2011).

Tick counts positively correlated to coat characteristics in cattle (Marufu, et al., 2011; Verissimo et al., 2002); and also it was observed that cattle with shorter and smoother coats carried lower tick counts (Marufu, et al., 2011). Generally it is believed that cattle breeds with short hairs exposed the ticks to harmful climatic conditions and to predators like birds (Tatchell, 1987; Taylor, 2006;

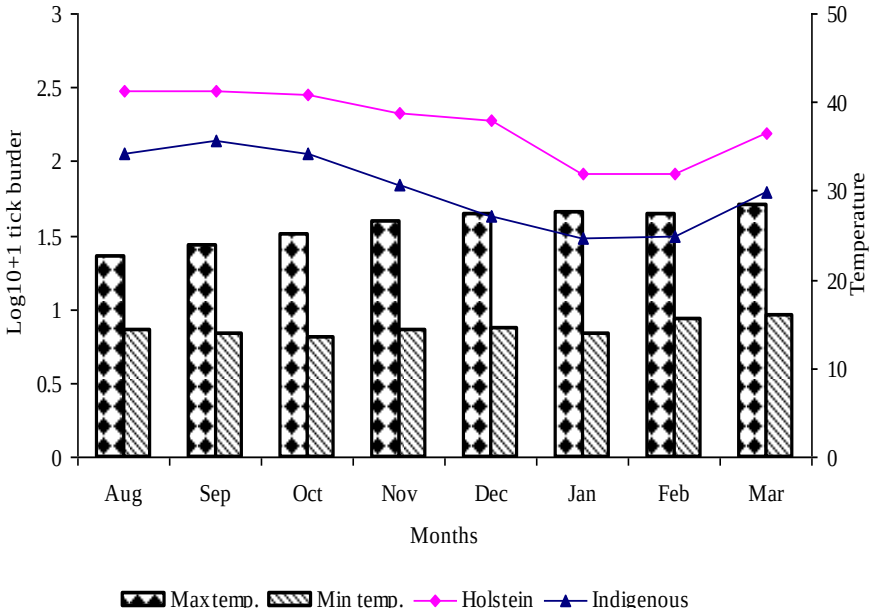

Figure 5. Trends of mean $log_{10}(X+1)$ tick burden of the breeds and temperature.

Table 1. Comparison of the two breeds of cattle half-body regions tick burden [$Log_{(X+1)}$]

Breed	Log transformed mean of half-body tick burden (Mean count)	Std. Err	95% CI	t-value	P-value
Indigenous	2.78 (601.8)	0.015	2.74-2.81	17.66	0.000
HC 50%	3.20 (1613.4)	0.019	3.16-3.24		
Total	2.99 (1107.6)				

Table 2. Seasonal variation of the major tick species identified during the study period ($Log_{10}(X+1)$)

Tick spp.	Season	Mean	Std. Error	t – value	P > |t|	[95% CI]	Significance
AV	Wet	4.304	0.594	4.3993	0.000	3.130 - 5.478	* * *
	Dry	1.565	0.187			1.195 - 1.936	
AG	Wet	2.261	0.173	-5.7173	0.000	1.919 - 2.603	* * *
	Dry	4.493	0.350			3.801 - 5.185	
AC	Wet	0.667	0.141	-1.2189	0.224	0.388 - 0.946	NS
	Dry	0.928	0.161			0.609 - 1.246	
AL	Wet	0.377	0.090	-2.3018	0.022	0.198 - 0.556	* *
	Dry	0.826	0.173			0.484 - 1.168	
BD	Wet	7.884	0.319	1.0566	0.292	7.253 - 8.516	NS
	Dry	7.348	0.394			6.568 - 8.128	
RhE	Wet	0.725	0.115	4.1495	0.000	0.497 - 0.953	* * *
	Dry	0.196	0.054			0.088 - 0.303	

NB. Equal variances assumed. (AV =*A. variegatum*, AG =*A. gemma*, AC = *A. cohaerens*, AL = *A. lepidum*, BD = *B. decoloratus*, RhE = *Rh. evertsi evertsi* NS = Not significant). * * * = Highly significant and * * = Significant)

Marufa et al., 2011). According to de Castro (1991) observation *Bos indicus* naturally self-groom and groom each other frequently and thoroughly. It is already known that grooming is a means by which the host can express resistance; fewer ticks were seen on those animals that were able to groom (Minjauw and de Castro, 2000; Brossard, 1998).

Tropical cattle breeds are known to possess short hair to overcome heat stress. And those animals with shorter hairs tend to have lower tick counts compared to those with longer hairs, since long hairs create favourable conditions for tick survival (Taylor et al., 1995; Marufa et al., 2011). Moreover, longer coat hairs may protect ticks from the animal's self-grooming that enables them to remove ticks attached to the coat (Machado et al., 2010). *B. indicus* were reported to be more innately resistant to *B*. *microplus* infestation (Wikel and Whelen, 1986).

Among the tick species identified seasonal variation was observed in four species, namely: *A. variegatum*, *A. gemma*, *A. lepidum* and *R. evertsi evertsi* (Table 2). This result is in a general agreement with observation of Kaiser et al. (1991) who reported that all stages of *Rh. evertsi evertsi* were less active during dry season. There was a significant seasonal variation of *A. variegatum* ($t = 10.2719$, $P = 0.05$ at $\alpha = 0.05$) in the study area, which was with highest mean count during wet period.

This finding is in agreement with that of Gebre et al. (2000) and Solomon (1993) observations at Sebeta and Abernossa, respectively. They recorded highest counts of *A. variegatum* in July and April, which coincide with the rainy months for the areas. Moreover, Hoogstraal (1956), Morel (1980), Petney et al. (1987), Yohualashet et al. (1995), Mattioli et al. (1997), Bekele (2002) and Assefa (2004) observed the seasonal fluctuation of this tick species with a relative rise in numbers during the short and long rains. The life-cycle of this tick species is most closely linked to rainfall. The adults were aroused by rain in the rainy months, in which by that time most had apparently found a host (Kaiser et al., 1988). In Ethiopia Pegram et al. (1981) observed that the onset of feeding activity of adult coincides with the start of wet season. From de Castro (1994) survey in western Ethiopia females, *A*. *variegatum* were mostly present in rainy time during collections of tick species.

The mean distribution of *A. gemma* ($t= 5.7173$, $P< 0.05$) and *A. lepidum* ($t= 2.3018$, $P< 0.05$) were significantly and seasonally varied. These ticks were highly prevalent during dry period, and they are xerophilous African species of *Amblyomma* (Morel, 1980). This finding is in a general agreement with Petney et al. (1987). There was a significant seasonal variation of *Rh*. *e*. *evertsi* ($t = 4.1495$, $P= 0.000$) with the highest collection of the adult in wet period (95% CI 0.497 to 0.953 and 0.088 to 0.303 during wet and dry periods, respectively). This finding is in line with Kaiser et al. (1991) who showed that all stages of this tick were less active during dry season. In fact according to Pegram et al. (1981), de Castro (1994) and Bekele (2002) it appears to occupy a wide range of climatic and ecological conditions with rain occurring in most of the year, and throughout the year.

CONCLUSION AND RECOMMENDATION

Ticks burden of Holstein-crosses (50%) was significantly higher than the local indigenous breed in all the seasons. So to increase cattle productivity in the study area and elsewhere in the country, consideration of the breed type would be helpful. But for this purpose, animal health extension work, especially on breed use for strategic tick control could be important.

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CONFLICT INTERESTS

The author has not declared any conflict of interests.

REFERENCES

Ali M, de Castro JJ (1993). Host resistance to ticks (Acari: Ixodidae) in different breeds of cattle at Bako, Ethiopia. Trop. Anim. Health prod. 25(4): 215-222.

Aragaw K (1994). Study on host resistance to natural infestation in Friesian and indigenous zebu cattle, DVM thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit. pp.1-34.

Assefa B (2004). A survey of ticks and tick-borne blood protista in cattle at Asela, Arsi Zone. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit. pp. 25-36.

Bekele T (2002). Studies on seasonal dynamics of ticks of Ogaden cattle and individual variation in resistance to ticks in eastern Ethiopia. Zoonoses Public Health 49(6):285-288.

Brossard M (1998). The use of vaccines and genetically resistant animals in tick control. Revue scientifique et technique-Office international des épizooties 17:188-193.

CSA (2010). Federal Democratic Republic of Ethiopia. Central Statistical Agency, Agricultural Sample Survey Report on Livestock and Livestock Characteristics. Volume II, 2009/10. Statistical bulletin 468, Addis Ababa, Ethiopia. Available at: http://www.sciepub.com/reference/216283

de Castro JJ (1991). Resistance to ixodid ticks in cattle with an assessment of its role in tick control in Africa. Breeding for disease resistance in farm animals. CABI, Wallingford, UK. pp. 244-262.

Gebre S, Nigist M, Kassa B (2000). Seasonal variation of ticks on calves at Sebeta in western Shewa Zone. Ethiop. Vet. J. 7(2):17-30.

Hoogstraal H (1956). African Ixodoidea. VoI. I. Ticks of the Sudan (with special reference to Equatoria Province and with Preliminary Reviews of the Genera Boophilus, Margaropus, and Hyalomma). African Ixodoidea. VoI. I. Ticks of the Sudan (with special reference to Equatoria Province and with Preliminary Reviews of the Genera Boophilus, Margaropus, and Hyalomma).

Jongejan F, Uilenberg G (2004). The global importance of ticks.

Parasitology 129(Suppl):S3-S14.
Kaiser MN, Sutherst RW, Bourne AS (1991). Tick (Acarina: Ixodidae) infestations on zebu cattle in northern Uganda. Bull. Entomol. Res. 81(3):257-262.
Kaiser MN, Sutherst RW, Bourne AS, Gorissen L, Floyd RB (1988). Population dynamics of ticks on Ankole cattle in five ecological zones in Burundi and strategies for their control. Prevent. Vet. Med. 6(3):199-222.
Latif AA, Walker AR (2004). An introduction to the biology and control of ticks in Africa. ICTTD-2 project. pp.1-29.
Machado MA, Azevedo AL, Teodoro RL, Pires MA, Peixoto MG, de Freitas C, Prata MC, Furlong J, da Silva MV, Guimarães SE, Regitano LC (2010). Genome wide scan for quantitative trait loci affecting tick resistance in cattle (Bos taurus× Bos indicus). BMC Genomics 11(1):280.
Marufu MC, Qokweni L, Chimonyo M, Dzama K (2011). Relationships between tick counts and coat characteristics in Nguni and Bonsmara cattle reared on semiarid rangelands in South Africa. Ticks Tick-borne Dis. 2(3):172-177.
Mattioli RC, Janneh L, Corr N, Faye JA, Pandey VS, Verhulst A (1997). Seasonal prevalence of ticks and tick-transmitted haemoparasites in traditionally managed N'Dama cattle with reference to strategic tick control in the Gambia. Med. Vet. Entomol. 11(4):342-348.
Minjauw B, De Castro JJ (2000). Host resistance to ticks and tick-borne diseases: its role in integrated control. Breed. Dis. Resist. Farm Anim. 153-169
Minjauw B, McLeod A (2003). Tick-borne diseases and poverty: the impact of ticks and tick-borne diseases on the livelihoods of small-scale and marginal livestock owners in India and eastern and southern Africa. Tick-borne diseases and poverty: the impact of ticks and tick-borne diseases on the livelihoods of small-scale and marginal livestock owners in India and eastern and southern Africa. Available at: https://www.cabdirect.org/cabdirect/abstract/20063155090
Moran MC, Nigarura G, Pegram RG (1996). An assessment of host resistance to ticks on cross-bred cattle in Burundi. Med. Vet. Entomol. 10: 12-18.
Morel P (1980). Study on Ethiopia ticks (Argasidae, Ixodidae) Republic of France, Ministry Of foreign affairs, French Vet Mission, Addis. CJEVT 12:332.
Okello-Onen J, Hassan SM, Essuman S (1999). Taxonomy of African ticks: an identification manual. International Centre of Insect Physiology and Ecology (ICIPE). Available at: https://www.cabdirect.org/cabdirect/abstract/20023066680
Pegram RG, Hoogstraal H, Wassef HP (1981). Ticks (Acari: Ixodoidea) of Ethiopia. I. Distribution, ecology and host relationships of species infesting livestock. Bull. Entomol. Res. 71(3):339-359.
Petney TN, Horak IG, Rechave Y (1987). The Ecology of the African vectors of heartwater, with particular reference to *Amblyomma hebraeum* and *Amblyomma variegatum*. Onderstepoort J. Vet. Res. 54: 381-395.
Porto Neto LR, Jonsson NN, Michael J, D'Occhio MJ, Barendse W (2011). Molecular genetic approaches for identifying the basis of variation in resistance to tick infestation in cattle. Vet. Parasitol. 180:165-172
Solomon G (1993). Resistance of three breeds of cattle to ticks and tick-borne diseases at Abernossa ranch, Ethiopia, Proceeding of the seventh Ethiopian Veterinary Association Conference. pp. 78-99.
Solomon G, Kaaya GP (1996). Comparison of resistance in three breeds of cattle against African Ixodid ticks. Exp. Appl. Acarol. 2(4): 223-230.
Tatchell RJ (1987). Interactions between ticks and their hosts. Int. J. Parasitol. 17(2):597-606.
Utech KBW, Wharton RH, Kerr JD (1978). Resistance to Boophilus microplus (Canestrini) in different breeds of cattle. Aust. J. Agric. Res. 29(4):885-895.
Verissimo CJ, Nicolau CV, Cardoso VL, Pinheiro MG (2002). Haircoat characteristics and tick infestation on gyr (zebu) and crossbred (holdstein x gyr) cattle. Archivos de zootecnia 51(195).
Walker AR (2003). Ticks of domestic animals in Africa: a guide to identification of species. Edinburgh: Bioscience. pp. 3-210
Wikel SK, Whelen C (1986). Ixodid-host immune interaction. Identification and characterization of relevant antigens and tick-induced host immunosuppression. Vet. Parasitol. 20(1-3):149-174.
Yohualashet T, Gebreab F, Wakijira A, Tsega T (1995). Preliminary observation on ticks: Seasonal Dynamics and Resistance of Three Indigenous and Three Cross-Bred Cattle in Ethiopia. Bull. Anim. Health Prod. Afr. 43(2):105-114.

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