

Full Length Research Paper

Optimizing cattle health through proper hoof care: Essential guidelines for farmers

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Cattle is one of the animals raised by animal farmers for income generation from milk and meat. This study was carried out to identify the practices required by farmers in hoof trimming for effective health management of cattle. The objectives of the study were to identify the practises required by farmers in planning for, preventive, curative, and the materials for hoof trimming of cattle. The study adopted descriptive survey research design and was carried out in The Netherlands. The population for the study was 38 comprising of 13 lecturers of animal science, 11 veterinary doctors, 10 extension agents and 4 hoof trimmers. There was no sampling because of the manageable size of the population. The instrument for data collection was a 45 item structured questionnaire. The questionnaire was validated by three experts in the dairy training centre. Data were collected by the researchers and analysed using mean and standard deviation. Findings from the study showed that a balanced hoof and proper body posture are the primary desired results of hooves trimming, for both routine or preventive approach, using the right tools. Findings further revealed that effective hooves trimming requires such activity based skills which needs to be hought to cattle keepers for effective animal health management The study therefore recommended that the identified techniques should be utilized in training of extension agents through workshop, and the farmers in a town hall meeting to make them effective in hoof trimming of their cattle in Nigeria.

Key words: Animal health, routine, training, preventive, cattle production, posture.

INTRODUCTION

In most countries of the world, beef and milk from cattle farming provides the bulk of the meat and milk consumed. Cattle could be kept for beef or milk. Beef cattle are mainly bulls (males) primarily raised for meat

production while milk producing cattle are cows (females). To derive the benefits inherent in animal farming, most cattle farmers keep the stock together as a herd for easy management. Management in animal

production relates to decisions on how to raise and run the business operations to ensure maintenance of the health status of the animals. It entails setting a production standard and working towards achieving them based on appropriate housing, feeding, and general health care of animals including hoof condition.

Major health care maintenance of cattle through hoof management is hoof trimming. Hoof trimming refers to the activities carried out on the foot of the animal to achieve proper heel and toe length for better balancing (Leacha et al., 2005; Hepworth et al., 2004). Hoof trimming is the removal of overgrown appendages or part of the horny materials covering the feet of animal for better balance/posture and healthy living (Ovniczek et al., 2003; Kummer et al., 2004, 2006). Hoof trimming is an essential part of animal management for raising cattle. Hoof trimming is aimed at helping cows have equal weight distribution to maintain the health status for enhanced production. Cattles in a herd should be frequently examined for abnormal hoof growth as overgrown hooves may make walking painful, predispose the animal to other foot and leg problems, and makes competing for feed difficult (Vermun, 2005; eF, 2016). This may cause animals to stop eating and exercising, become susceptible to joint and tendon problems and arthritis. Also, breeding animals use their hind legs during mating; mating and reproductive performance of a herd may seriously be affected if hooves of breeding males are not trimmed. Herd owners must realize that for maximum cattle health and longevity, through hoof and leg soundness, regular hoof care is a must (McKendrick et al., 2010; Duberstein et al., 2013).

Depending on the environment hoofed animals live in and the diet they are fed, some animals require that their feet be trimmed every 6 weeks to 2 months (Chesterton, 2004; Kummer et al., 2006; Hampson, 2011a, 2011b; Malone and Davies, 2011; Duberstein et al., 2013). A minimum of 2 to 3 times a year is essential for almost all animals no matter their diet or environment (Leacha et al., 2005). Hoof trimming is needed more on the hind legs than on the front. Better (2011) explained that front hooves naturally tend to get worn out faster and so the hind hooves need to be trimmed regularly for better balance. The author further stated that as the hind hooves grow, they tend to turn under on the sides and protrude outwards to become elf shoes thereby requiring trimming very regularly. Special attention is needed in trimming hoof walls especially when it is overgrown (Mob et al., 2014). There are two types of hoof trimming which are preventive and curative. Preventive also called functional or routine hoof trimming is carried out to avoid occurrence of lameness and claw diseases while curative hoof trimming is carried out to address injury in the hooves as well as to control infectious diseases in the foot in cows (Cook, 2005; Hüppler et al., 2015; Ype, 2015). Whichever method is needed at the time of trimming, the skills are to be known and use of the

relevant tools mastered. Related studies on horse and goat keeping outlines the stepwise approaches and techniques for hoof trimming (Ovniczek et al., 2003; Better, 2011; Gordon et al., 2012; Elham and Faisal 2015). These techniques if applied in both preventive and curative hoof trimming increases the health status of the cow (McKinzie et al., 2006; Better, 2011; Hampson, 2011a, b) thereby helping farmers earn more income for sustainability of their families. A drive for this study is the prevalent poor hoof management among herds in cattle rearing countries in Africa, especially in Nigeria.

Nigeria is an equatorial and tropical country with average temperatures of 80 to 90° F (26.6 to 32.2°C) and rainfall that storms almost every day, especially in the rainy season (mainly April to August) (Ikehi et al., 2014; Ifeanyieze et al., 2016). During the rainy season cattle are left in open swampy places. Some farmers in the country adopt intensive system of cattle management while few others depend on extensive system-nomadic. Cattle rearing in Nigeria are predominantly in the northern part with few local breeds reared in the South. With the listed dangers resulting from poor hoof management in herds, it is likely that cattle farmers in most regions of the world particularly in Africa and mostly in Nigeria are not meeting the expected output in their farms when compared with informed farmers in other developing and developed nations. A clear case of the low production is in the Southern part of Nigeria, where the local breeds could be better managed for higher production but farmers lack the relevant skills and available material. Further, most researches on hoof management are on Equine (mainly horses) with very limited studies on cattle hoof management. Interactions with contact cattle farmers in Nigeria revealed that most of the farmers observe the hoof claws of their cattle growing outwardly, cracked hooves and other hoof problems among their herd but bother less about it or do not even know what to do. The consequence is low production of milk and/or meat. The study was thus conceived to present the hooves trimming activities, skills and how to go about cattle hoof trimming. Specifically, the objectives of this study were to identify the techniques required by farmers in (a) planning for hoof trimming of cattle (b) preventive hoof trimming of cattle (c) curative hoof trimming of cattle, as well as (d) the materials required for hoof trimming of cattle.

METHODS

The study was carried out to identify skills required by farmers in hoof trimming for effective health management of dairy cattle. The study adopted descriptive survey research design and was carried out in Onkerk-Friesland in The Netherlands. The study was carried out in The Netherlands where experts converged for training on hoof management. The population for the study was 38 comprised of 13 lecturers of animal science, 11 veterinary doctors, 10 extension agents and 4 hoof trimmers, and where from Ethiopia

Table 1. Mean ratings of respondents on techniques required in planning for hoof trimming of cattle

Response option	Value	Real limit
Highly required (HR)	4	3.50 - 4.00
Averagely required	3	2.50 - 3.49
Slightly required	2	1.50 - 2.49
Not required	1	0.00 - 1.49

Table 2. Mean ratings of respondents on techniques required in planning for hoof trimming of cattle (N=38).

S/N	Item statement on planning for hoof trimming of cows	Mean	SD	Decision
1	Determine the objective of hoof trimming	3.70	1.12	HR
2	Identify hoof trimming tools and equipment	3.52	1.01	HR
3	Locate the market for purchasing the tools (if none is available)	3.13	0.82	AR
4	Budget for the purchase of the identified tools and equipment	3.13	0.81	AR
5	Identify source of fund for purchasing the tools and equipment	3.74	1.22	HR
6	Buy the tools and equipment based on budget and prices.	3.22	0.87	AR
7	Sharpen the trimming knives and others that require sharpening	3.39	0.90	AR
8	Locate the group of cows that need foot trimming within the herd	3.43	0.97	AR
9	Identify individual cows that require hoof trimming	3.57	1.05	HR

(11), Bhutan (6), Indonesia (5), Pakistan (4), Friesland, The Netherlands (4), Egypt (3), Nigeria (2), Ghana (1) and Tanzania (1). There was no sampling due to the manageable size of the population. The instrument for data collection was a questionnaire with 47 items developed from literature reviewed for the study and through functional industry approach (scheduled visits to various dairy farms in Friesland in The Netherlands to observe the skills displayed and materials used by experienced cattle farmers in hoof trimming. The materials and techniques were compiled in form of questionnaire for this study. The questionnaire was made up of two parts- 1 and 2. Part 1 with 2 items sought information on the background of the respondents like country and major occupation while part 2 comprised of 45 items grouped into techniques in (a) planning for hoof trimming with 9 items, (b) preventive hoof trimming with 15 items (c) curative hoof trimming with 9 items and (d) materials required in hoof trimming with 13 items. Each item in the questionnaire was assigned four response options of Highly Required (HR); Averagely Required (AR); Slightly Required (SR) and Not Required (NR) with means values of 4, 3, 2 and 1 respectively. Three experts from dairy training Centre Oenkerk in The Netherlands validated the questionnaire to make it suitable for data collection. Cronbach alpha reliability test for instrument had 0.87 coefficient value. Data collected were analysed using means to analyse response for the research objectives and standard deviation (SD) to validate the means. In taking decision on the required item, real limit of numbers were assigned to the response options as shown in Table 1. Therefore, the result in each table was interpreted in line with the real limit and the corresponding response option as highly required for items with mean values within the real limit of 3.50 - 4.00; averagely required for items with mean value within the real limit of 2.50 - 3.49; slightly required for items with mean value within the real limit of 1.50 - 2.49 and not required for items with mean value within the real limit of 0.00 - 1.50. Generally, any item with a mean value of 1.50 or above was regarded as required while any item with a mean value below 1.50 was not required. Standard deviation as a user statistic was used to validate the means and the closeness of the respondents to the means. So

any item with a standard deviation of 1.96 or below indicated that the respondents were close to the mean and to one another in their responses while any item with a standard deviation above 1.96 indicated that the respondents were far from the mean and from one another in their responses.

RESULTS

Accomplishing any task begins with planning, same applies for hoof management as presented on Table 2. Data in Table 2 revealed that 4 out of 9 items had their mean values ranging from 3.52 to 3.74. These values were within the real limit of 3.50 to 4.00; indicating that the four items (S/N 1, 2, 5 and 9) were highly required in planning for hoof trimming. The remaining five items (S/N 3, 4, 6, 7 and 8) had their mean values ranging from 3.13 to 3.43 which were within the real limit of 2.50 to- 3.49; indicating that the five items were averagely required in planning for hoof trimming. The table also showed that the standard deviation (SD) of the 9 items ranged from 0.81 to 1.22; indicating that the respondents were close to the mean and to one another in their responses. Generally, all the nine items were required in planning for hoof trimming of cattle as their means were greater than 1.50.

Putting the plan into action means that the farmer is willing to through the processes of ensuring good health among the herd through hoof management, beginning with routine steps as presented in Table 3.

Data in Table 3 revealed that 7 out of 15 items had their mean values ranging from 3.57 to 3.94. These values

Table 3. Mean ratings of the respondents on techniques required in routine hoof trimming of cattle (N=38).

S/N	Item statement routine hoof trimming of cattle	Mean	SD	Decision
1	Place a crush in appropriate position	3.69	1.01	HR
2	Isolate the cow that need hoof trimming out of the group	3.91	1.00	HR
3	Lead the cow to the crush	3.48	0.93	AR
4	Restrain the cow with chain and belt within the crush	3.57	0.99	HR
5	Wear apron and hand glove	3.61	1.04	HR
6	Measure the claw of the cow with appropriate tool	3.44	0.98	AR
7	Adjust the handle of the crush to lift the leg of the cow in appropriate position and level.	3.61	1.03	HR
8	Clean the hoof of the cow with saw dust	3.09	0.78	AR
9	Pick the trimming knife with the right hand	3.35	0.39	AR
10	Pick the hoof with the left hand gripping it firmly and in bending position	3.45	0.99	AR
11	Observe the safety precaution for the safety of the animal and the trimmer	3.57	0.95	HR
12	Cut back the overgrown claws	3.94	0.98	HR
13	Cut the outer claw to level up with the inner claw	3.89	1.02	HR
14	Model claws by making hollow-shaped curve of 2-3mm from the toe	3.39	0.85	AR
15	Release the hoof and unwind the crush handle to release the cow	3.30	0.64	AR

were within the real limit of 3.50 to 4.00; indicating that the eight items (S/N 1, 2, 4, 5, 7, 11 to 13) were highly required skills to learn in routine hoof trimming. The remaining seven items (S/N 3, 6, 8, 9, 10, 12, 14 and 15) had their mean values ranged from 3.09 to 3.48 which were within the real limit of 2.50 to 3.49; indicating that the five items were averagely required in planning for hoof trimming. The table also showed that the standard deviation (SD) of the 15 items ranged from 0.39 to 1.04; indicating that the respondents were close to the mean and to one another in their responses. Generally, all the fifteen items were required in routine hoof trimming of cattle as their means were greater than 1.50.

At the end of routine hoof management, attention is directed at special issues such as injuries which occurred during the trimming. The purpose of the curative hoof management is to avoid infections, unintended infliction of pains and foot damage. The steps are presented in Table 3.

Data in Table 4 revealed that two out of nine items had a mean value of 3.70 and 3.64 respectively. The value was within the real limit of 3.50 to 4.00; indicating that the items (S/N 2 and 6) were highly required in curative hoof trimming. The remaining eight items had their mean values ranged from 3.17 to 3.44 which were within the real limit of 2.50 to 3.49; indicating that the eight items were averagely required in curative hoof trimming. The table also showed that the standard deviation (SD) of the 9 items ranged from 0.32 to 1.12; indicating that the respondents were close to the mean and to one another in their responses. Generally, all the nine items were required in curative hoof trimming of cattle as their means were greater than 1.50.

Accomplishing any task effectively and efficiently requires the use of the right tools. The tools needed for hoof management are presented in table for rating by

the respondent experts, based on the level of relevance in ensure better herd health through hoof trimming.

Data in Table 5 revealed that 8 out of 13 items had their mean values ranged from 3.55 to 3.93. The values were within the real limit of 3.50 to 4.00; indicating that the eight items were materials highly required in hoof trimming. Three of the items (S/N 2, 11 and 12) were averagely required as they had their mean values ranged from 3.17 to 3.44 which were within the real limit of 2.50 to 3.49. The remaining two items (S/N1 and 6) had mean values of 2.21 and 2.45 which were within the real limit of 1.50 to 2.49; indicating that the two items were materials slightly required in hoof trimming. The table also showed that the standard deviation (SD) of the 13 items ranged from 0.03 to 1.32; indicating that the respondents were close to the mean and to one another in their responses. Generally, all the thirteen items were required materials for hoof trimming of cattle as their means were greater than 1.50.

DISCUSSION

The result of the study on Table 2 revealed that planning for hoof trimming requires such activities as knowing the objective, identify hoof trimming tools and equipment, budgeting and purchasing the tools and equipment required, and sharpen trimming knife and others. Every task requires adequate planning for effectiveness. Setting objectives guides the task; in this case keeping the cattle in the herd free of overgrown hooves for healthiness becomes the task that must be achieved. But achieving the practicable task of trimming overgrown hooves requires the purchase (through efficient budgeting based on available fund) and utilization of the right tools and equipment at their effective form. The findings of the

Table 4. Mean ratings of the respondents on techniques required in curative hoof trimming of cattle (N=38).

S/N	Item statement on curative hoof trimming	Mean	SD	Decision
1	Carry out steps 1-14 of preventive hoof trimming	3.39	0.85	AR
2	Identify any wound and the typical spot by pressing to trimmed hoof while observing the reaction of the cattle	3.64	0.48	HR
3	Observe the reaction of the cow at each pressing of the quick	3.44	0.98	AR
4	Lower the outer claw to 2/3 towards the sole of the heel to transfer the weight of the wound to the healthy claw	3.44	0.98	AR
5	Apply block to the sound claw if the level of the inner and outer claws is not equal. Hold the block for 3minutes to gum firmly	3.44	0.98	AR
6		3.70	1.12	HR
7	Release the hoof and unwind the crush to release the cow	3.44	0.97	AR
8	Relocate the cow to release the block after 5-6 weeks	3.39	0.85	AR
9	Remove hard ridges in the claw	3.17	0.32	AR

Table 5. Mean ratings of the respondents on materials required in hoof trimming of cattle (N=38).

S/N	Item statement on the materials in hoof trimming	Mean	SD	Decision
1	Tilt table	2.21	0.03	SR
2	Small board	3.12	0.68	AR
3	Hoof knife	3.93	1.09	HR
4	Gloves	3.86	1.27	HR
5	Apron	3.51	0.91	HR
6	Iodine	2.45	0.41	SR
7	Hoof pick	3.71	1.23	HR
8	Rasp	3.59	1.01	HR
9	Brush	3.55	1.06	HR
10	Nippers	3.72	1.21	HR
11	Wood block	2.55	1.10	AR
12	Boot	3.15	0.91	AR
13	Saw dust	3.75	1.32	HR

study pose the need to begin teaching cattle farmers in Nigeria how to plan for hooves trimming and maintain a regular cycle of activities while aiming to keep the herd healthy through hooves management. The planning activities identified here conform to planning activities in most tasks in other fields as presented by various authors (Drummond and Goodwin, 2011; Kent, 2011; Talathi et al., 2011; Ifeanyieze et al., 2014; Onu et al., 2014).

The findings of the study in Table 3 revealed that routine or preventive hoof requires such activity based skills like: Isolating and restrain the animal needing hooves trimming, measuring the claw to determine the excess growth and applying standard cutting procedure to remove the overgrowth. Isolating the animal needing hooves trimming had a high mean rating (after S/N 12; cutting back by the experts). Obviously, this should be the very important task, as the farmer should be able to differentiate an overgrown hoof from a normal hoof. Authors such as Leacha et al. (2005), McKendrick et al. (2010) and Joanne (2010) explained how to identify farm

animals with improper hooves from their body posture and limited functionality. Most of the items on Table 3 are easily performable tasks except for the actually hoof cutting, which is the main activity. In trimming off the excess, PTC (2015) explained that cutting back the inner claw to a length of 7.5 cm leaving 5 to 7 mm thickness in the tip of the toe would save the height of the heel. The author explained that the outer claw should be trimmed to be equal in length and height as the inner. Further, the author explained that the claw cutting should be modelled by cutting into a slightly hollow shape starting 2.5 to 3 cm from the toe. From Table 4, treatment of any observed wound helps to prevent infections. As indicated in the data on Table 4 as curative hoof trimming skills, PTC (2015) explained the corrective measure in the case of wounded sole to be to transfer the weight of the wounded sole to the sound claws by lowering 2/3 of the outer claw towards the sole of the heel. The attachment of the block covers the injured sole cushioning possible pains and walking difficulties for the animal, and can be removed

when the trimmed hoof is healed. While the identified steps or practices can easily be narrated, the practise would need more detailing and even one on one training for the less informed farmer. The findings of the study conform to that of other authors on basic techniques and practices in hoof trimming (Ovniczek et al., 2003; Kloosterman, 2004; Kummer et al., 2006; Joanne, 2010; Hüppler et al., 2015; Caldwell et al., 2016)

The experts identified the items enlisted on Table 5 as required tools/equipment for any cattle farmer aiming to trim overgrown hooves of any cattle in a herd. The respondents indicated that the tilt table and iodine solution are slightly required (SR) probably because a farmer with a need to trim overgrown hooves but lacks a table could improvise and iodine solution is needed only in the case of wounded sole. While the tilt table is slightly needed, a small board, wood block and boot are averagely required (AR) because the trimmed hoof needs to be placed on a platform separating it from dirt (if not suspended with a mechanical tool). Like the iodine, the Wood block is needed as corrective item in the case of a wounded sole. The Boot on the other hand is to be worn by the trimmer (farmer) as a safety kit. However, like the use of table, the farmer can improvise and any other foot cover. Other items like the hoof knife, hoof pick, rasp and nippers among others well indicated to be highly required (HR). It is obvious that the trimming activity will not be efficient without these tools as explained by Kloosterman (2004), Jan (2008), Malone and Davies (2011) and Ype (2015).

Balance is the primary concerns and objectives when trimming. A balanced hoof and proper body posture are the primary desired results of hooves trimming. This improves the health status of the animal and allow it to perform better like other normal hoofed cattle in the herd. Improving the healthiness of overgrown hooves through regular trimming improves the general health of the herd which directly improves economic returns of the farmers. However, contacting hoof trimmers on a regular base might be uneconomical for the already indigent cattle farmers in both the northern and southern region of Nigeria, and likely other rural African nationals. More so, finding a (professional) hoof trimmer to come down to the locations of the cattle keepers will always prove difficult as the farmers are scattered and the professional trimmers are very few. These techniques can be taught to the farmers, including the nomadic ones to help them improve in cattle management. The study therefore recommended that the identified techniques should be utilized in training of extension agents through workshop, and the farmers in a town hall meeting to make them effective in hoof trimming of their cattle in Nigeria. The trained extension agents could help the farmers perfect the skills by scheduling visits for a group of farmers to ascertain perfection level and further clarify any misunderstandings. The training for both the extension agents and the farmers could be organised by the

government through the ministry of Agriculture and/or by agro-allied Non-governmental Agencies (NGOs) who are interested in improving the economic welfare of cattle farmers and cattle production in Nigeria.

Conflict of Interests

The authors have not declared any conflict of interests.

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