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Investigation of constraints to health and production of cattle in North-East Bangladesh

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Abstract

The study was designed to investigate the constraints to health and productivity of dairy farms and their possible remedies in Sadar Upazila (sub-district) of Sylhet, Sreemangal Upazila at Moulavi Bazar, Chatak and South Sunamgonj Upazila at Sunamgonj districts. Ninety dairy farms including marginal and small (2-10 cows), medium (11-25 cows) and large (>25 cows) of urban, suburban and rural areas were randomly selected for multistage sampling. Farmers were interviewed using pre-tested questionnaire. The major constraints were high price of concentrate, poor knowledge of feeding, scarcity of forage, weak recording system, cost of high yielding well-adapted milking cows, prolonged postpartum anoestrus, repeat breeding, incorrect timing of AI, mastitis, low pregnancy rate, lack of milk co-operative, weak milk marketing and high veterinary cost. To overcome the current situation government should give incentives on cattle feed and credit facility with soft interest to the farmers; DLS and other organizations should arrange effective training on dairy farm management. (*Bangl. vet*. 2020. Vol. 37, No. 1 - 2, 1 – 13)

Introduction

The dairy sector has huge prospects to create employment and alleviate poverty in Bangladesh. Annual milk production is 9.4 million metric tonnes, which is only 63% of demand in the country (DLS, 2018). Therefore, Bangladesh imports powdered milk and other dairy products (Haque, 2009; Uddin *et al*., 2015). Around 3.6 million households in Bangladesh produce milk in small and medium dairy farms, along with crops and off-farm activities (Datta *et al.*, 2019). Dairy farming in north-east region is still growing, and contributing substantially to the economic development. Constraints to production and health of dairy cattle in north-east Bangladesh have not been well studied. The objective of the study was to investigate the constraints to health and production of cattle in dairy farms of north-east Bangladesh.

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Materials and Methods

Selection of study area

The study was carried out in three regions of north-east Bangladesh: Sadar Upazila (Sub-district) of Sylhet district; Sreemangal Upazila at Moulavi Bazar district and Chatak and South Sunamgonj Upazila at Sunamgonj district of Sylhet division. A total of 90 dairy farms (15 urban, 30 suburban and 45 rural), 30 from each region were selected. The study was conducted from July 2018 to December 2019.

Selection of farms

Using multi-stage random sampling, small (2-10 cows), medium (11 - 25 cows) and large (>25 cows) commercial dairy farms (Hamid and Hossain, 2014; Halder and Barua, 2003) were selected.

Farms Survey

A pre-tested survey data sheet was designed by discussing with farmers, dairy experts and Department of Livestock Service (DLS) representatives. Primary data were collected by face-to-face talks with farmers. The questions were asked with brief explanation of the objectives. The questionnaire gathered information on livestock composition, health and production constraints, production, feeding, marketing, veterinary services, age at first calving, calving interval, repeat breeding, and diseases. Secondary data and information were gathered from DLS and non-governmental organizations (NGOs), other peer-reviewed papers, bulletins, and reports.

Animals and ethical issues

The data on dairy cattle were collected directly from farmers and clinically examined animals through a pre-designed questionnaire, regarding number of cows, type of animals, breed, age, sex, body weight, feeding and grazing systems, milk yield, methods of detecting oestrus, breeding strategy, reproductive performance; reproductive herd health management; diseases; mastitis, milk fever; ketosis; deworming strategy and immunization. Body Condition Score (BCS) was assessed on a 1 - 5 scale as described by Edmondson *et al*. (1989). Body weight of the animals was estimated by the measuring tape (RONDOP Hauptner instrument, GmBH, CH 8304 Wallisellen, SWITZERLAND). The ethical approval was granted from Sylhet Agricultural University (SAU) Animal Experimentation Ethics committee.

Feeding of animals

Cattle were daily fed local grass (5 - 6 kg), hybrid Napier (6 - 8 kg), *ad libitum* rice straw and water. Some farmers supplemented water-hyacinth. In some farms, animals were fed commercial concentrates or home-made concentrate, mostly made of wheat bran, rice polish, crushed maize, oil cakes, crushed pulses, common salt, vitamin-mineral premix. Some householders supplied 1 - 2 kg extra wheat bran and rice polish to lactating cows. All cattle of urban and suburban areas were provided stall feeding

without grazing and free space for exercise, but cattle of rural areas were grazed in pasture or in roadside areas.

Blood sample collection

Blood samples were collected by jugular vein puncture (BD Vacutainer, USA) with disposable blood collecting tube with and without EDTA (Bioson Medical Technology Co ltd, Korea).

Faecal sample collection

Faecal samples were picked up from rectum of animals and stored at 4°C until processed for identification of parasitic egg using standard floatation and sedimentation technique (Taylor *et al.*, 2016).

Blood protozoa identification

Blood samples containing anticoagulant were examined by preparing two thin smears stained with 10% Giemsa stain. Fifty fields from each slide were tested under binocular microscope (100x) for identification of blood protozoa (Urquhart *et al.*, 1996).

Indirect ELISA

Serum samples were tested for antibodies to *Mycobacterium bovis* using indirect Enzyme-Linked Immunosorbent Assay (ELISA) kit (Bio-equip, China) following the manufacturer's instructions.

Statistical analysis

Data were inserted onto Excel spreadsheet using the Microsoft excel 2010 (Microsoft Corporation, Redmond, USA). Basic descriptive statistics were calculated to outline the constraints affecting the farmers. Results were stated in frequency and percentage tables and the identified constraints were ranked by Garrett's ranking technique using following formula: Percent position = {100 X (Rij-0.5)}/Nj. Where, Rij = rank given to ith trait by the jth individual, Nj = number of traits positioned by the jth individual. The percent position of each rank was converted into scores by the method of Garrett and Woodworth (1969). For each factor, the scores of individual respondents were added together and divided by the total number of respondents. These mean scores for all the factors were prepared in descending order and the constraints were ranked.

Results and Discussion

A total of 1491 cattle from 90 dairy farms were analysed, of which 783 were cows (554 milking and 229 dry), 105 bulls, 132 heifers, 214 male calves and 254 female calves (Table 1). The dairy cattle populations of urban, suburban and rural areas were 447 ± 13.8, 727 ± 8.8 and 317 ± 2.2, respectively. Among the cattle population, the total milking cows were 37.2%. In urban, suburban and rural areas, the percentages of milking cows were 11.5, 19.8 and 5.8%, respectively. The replacement heifers, male

and female calves were 9.0, 14.4 and 17.0%, respectively among total cattle population. The total milking cows' population was below the standard (50%) of an economically profitable dairy farm (Shamsuddin *et al*., 2006; Nordlund *et al*., 2007; Nor *et al*., 2015). The deficit of replacement heifers, 9.0% against the target of 30 - 40%, would prevent farmers culling the less productive cows (Shamsuddin *et al*., 2006; Nordlund *et al*., 2007; Nor *et al*., 2015) and so would increase production costs.

Table 1: Dairy cattle population in three regions of selected farms in North-East Bangladesh

Parameter	Urban area (Mean ± STD) (n = 15, (%)	Suburban area (Mean ± STD) n = 30, (%)	Rural area (Mean ± STD) n = 45, (%)	Total (Mean ± STD) n = 45, (%)	Percent (%)
All cattle	447 ± 13.8(29.9)	727 ± 8.8(48.8)	317 ± 2.2(21.3)	1491 ± 12.5	100
Dairy cows	243 ± 7.7(16.3)	402 ± 5.3(26.9)	138 ± 1.4(9.3)	783 ± 8.7	52.5
Milking cows	172 ± 5.2(11.5)	295 ± 4.1(19.8)	87 ± 0.8(5.8)	554 ± 6.2	37.2
Bull	34 ± 2.9(2.3)	43 ± 0.9(2.8)	28 ± 0.7(1.9)	105 ± 1.2	7.0
Heifer	45 ± 2.5(3.0)	62 ± 1.5(4.2)	30 ± 0.6(2.0)	135 ± 1.5	9.0
Male calves	54 ± 2.3(3.6)	102 ± 1.5(6.8)	58 ± 0.7(3.9)	214 ± 2.4	14.4
Female calves	74 ± 2.6(4.9)	118 ± 1.4(7.9)	63 ± 0.8(4.2)	254 ± 2.8	17.0

Among all cattle 68.3% were Holstein-Friesian cross, 4.0% Jersey cross, 8.1% Sahiwal cross, 4.3% Red Sindhi cross and 15.2% indigenous. In rural areas no exotic crosses were reared, and no indigenous cattle were found in urban and suburban areas (Table 2). The result agrees with the findings of Khan *et al*. (2010); Gizaw *et al*. (2017) but differs from findings of Dipu *et al*. (2019).

Table 2: Breeds of cattle reared in North-East Bangladesh

Breeds of cattle	Dairy cows			Bull			Heifer			Calves			Sub-total (%)
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	
Holstein Friesian X	203	324	0	26	30	0	38	47	0	127	227	0	1019(68.3)
Jersey X	21	39	0	0	0	0	0	0	0	0	0	0	60 (4.0)
Sahiwal X	12	23	22	6	10	7	2	8	8	0	0	23	121(8.1)
Red Sindhi X	7	16	9	2	3	6	0	3	3	0	0	15	64 (4.3)
Indigenous	0	0	107	0	0	18	0	0	20	0	0	82	227 (15.2)
Sub-Total	243	402	138	34	43	28	42	62	30	128	220	121	-
Percentage	16.3	26.9	9.3	2.3	2.9	1.9	2.8	4.2	2.0	8.6	14.8	8.1	
Total	1491(100%)												

The dairy farmers identified many constraints to health and production. The constraints related to feeding are presented in Table 3. Overall, 64.8% of farmers reported high price of concentrate feed, which ranked 1, followed by inadequate knowledge on scientific feeding (55.8%), scarcity of green grasses (47%), lack of pasture (46.8%) and lack of quality food (35.0%). The dairy farmers of urban and suburban areas were facing more challenges on feeding compared to rural farmers. The scarcity of green grasses was more often reported in urban areas (53.0%) compared to suburban and rural areas. Due to higher price of concentrate food and shortage of green grasses net returns of farms were decreasing.

Table 3: Constraints of feeding in urban, suburban and rural areas of North-East Bangladesh

Constraints	Urban areas (n = 15)		Suburban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
High cost of concentrate	71.0	1	73.5	1	56.9	2	64.8	1
Scarcity of green grass	53.0	2	50.8	2	42.2	4	47.0	3
Lack of pastureland	53.0	2	50.5	3	42.3	3	46.8	4
Inadequate knowledge on scientific feeding	37.0	3	45.5	4	69.0	1	55.8	2
Lack of quality food	33.7	4	29.7	5	39.1	5	35.0	5

The lack of pasture was more prominent in urban and suburban areas. Rural farmers grazed their cattle on nearby pasture or roadside grass, except during the rainy season. The present findings are similar to those of Uddin *et al*. (2012); Hafeez and Rahman, (2014); Nararyan *et al*. (2014); Onono and Ochieng (2018); Didanna *et al*. (2019). Many farmers lacked knowledge on scientific feeding, similar to the findings of Uddin *et al*. (2012); Hafeez and Rahman (2014); Nararyan *et al*. (2014); Getachew and Tadele (2015) and Panchbhai *et al*. (2017). Training on feeding practice might be useful to reduce the feeding cost.

The constraints on management are shown in Table 4: About 70% of farmers had no formal record keeping, which ranked 1st in management constraint. Lack of milking technology ranked 2, inadequate knowledge on cattle shed construction and hygiene 3, lack of cleaning of shed floor 4, lack of pure drinking water 5 and high calf mortality 6. Most of the farmers of urban and suburban areas did not have records of information such as breed, age, parity, pedigree history, fertility history etc. Most rural households (69.7%) had no record keeping. The results agree with the findings of Dipu *et al*. (2019); Rajpoot *et al.* (2018); where they reported 100, 80% and 79% of the farmers had no dairy management record in parts of Bangladesh, India and Ethiopia. The farmers of this region did not have good methods of milking, farm hygiene and cattle shed construction. Most of the farmers did not perform pre-milking and post-

milking teat dipping. The results agree with findings of Quddus, (2012); Rajpoot *et al.* (2018); Panchbhai *et al.* (2017); Onono and Ochieng (2018). Due to lack of clean floor the cattle suffered infectious diseases. The result accords with the findings of Quddus, (2012); Narayan *et al*. (2014). Calf mortality was reported as a challenge by 14.5% of respondents. This finding is similar to the results of Yeasmin *et al*. (2014) and Panchbhai *et al*. (2017).

Table 4: Constraints of farm management in urban, suburban and rural areas of North-East Bangladesh

Constraints	Urban areas (n = 15)		Suburban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Inadequate knowledge on cattle shed construction and hygiene	497	3	47.3	4	44.4	3	46.3	3
Lack of cleaning of cattle shed floor	46.7	4	48.8	3	43.1	4	45.6	4
Poor/*No Farm Data record	66.7	1	70.2	1	70.3	1	69.7	1
Lack of scientific technology of milking	62.0	2	58.7	2	60.4	2	60.1	2
High calf mortality	20.0	6	16.7	6	11.1	6	14.5	6
Lack of supply of pure drinking water	25.0	5	25.0	5	31.7	5	28.3	5

Constraints on dairy cow characteristics are shown in Table 5. The cost of high-yielding dairy cows was the main challenge for all types of farmers (65.0%): urban (73%) and suburban (69%) farmers reported this constraint more often than the rural farmers.

Table 5: Constraints of availability of quality cattle in North-East Bangladesh

Constraints	Urban areas (n = 15)		Sub-urban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Lack of well-adapted milking cows	54.4	2	53.3	2	41.7	3	47.7	3
Shortage of high-yielding Dairy cows	34.6	4	36.5	4	69.6	1	52.7	2
Shortage of replacement heifers	38.0	3	40.2	3	29.3	4	34.4	4
Cost of high yielding dairy cows	73.0	1	69.0	1	59.4	2	65.0	1

Lack of well-adapted dairy cows was the second problem in urban (54.4%) and suburban (53.3%) farms followed by lack of high-yielding dairy cows and replacement heifers. Shortage of high-yielding dairy cows was the problem ranked 1 in rural areas (69.6%) in contrast to others. The urban and sub-urban farmers lacked well-adapted high-yielding dairy cows because of their high price and unavailability. This result is similar to the findings of Mutavi and Amwata, (2018). Shortage of replacement heifers was major issue, with only 9.0% replacement heifers against the standard of 30-40% (Shamsuddin *et al*., 2006; Nordlund *et al*., 2007; Nor *et al*, 2015).

The constraints related to production and reproduction of dairy farms is depicted in Table 6. Among these, the problem most commonly reported was prolonged postpartum anoestrus (57.3%), followed by repeat breeding syndrome (51.3%), low pregnancy rate (48.7%), low milk production (48.4%) and delayed age at first calving (44.0%).

Table 6: Constraints of production and reproduction in North-East Bangladesh

Constraints	Urban areas (n = 15)		Sub-urban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Delayed age at first calving	28.0	5	25.0	5	62.0	2	44.0	5
Prolong postpartum anoestrus	44.7	4	43.0	4	71.1	1	57.3	1
Repeat breeding	67.0	1	70.2	1	33.6	5	51.3	2
Low milk production	53.0	3	50.7	3	45.3	3	48.4	4
Low pregnancy rate	56.7	2	61.2	2	37.8	4	48.7	3

Repeat breeding syndrome was the main constraint in urban and sub-urban dairy farms; conversely, the main challenge facing rural farmers was prolonged postpartum anoestrus. The result agrees with the findings of Uddin *et al*. (2012); Dipu *et al.* (2019); Patel (2014); Hadush *et al.* (2013) at Chattogram in Bangladesh, Gujarat in India and central Ethiopia, respectively. Although farmers of urban and suburban areas reared high-yielding crossbred cows, the pregnancy rate and milk production of cows were comparatively low and thus production cost was relatively high. Accurate heat detection with correct timing of AI could decrease the repeat breeding cases and special care of cows during transition period could reduce the postpartum anoestrus in cows.

Breeding constraints are shown in Table 7. The constraint that ranked 1 was proper timing of AI (63.2%). Heat detection (57.5%) ranked 2 followed by lack of awareness towards AI (56.2%), non-availability of pedigree bull (55%), non-availability of AI (53.5%) and poor performance of AI technician (31.6%). Improper timing of AI, poor heat detection and non-availability of pedigree bull remained the leading constraints

in urban and suburban areas, whereas in rural areas non-availability of AI and lack of awareness towards AI were the most important constraints. Due to incorrect timing of AI and poor heat detection, repeat breeding syndrome was high in urban and suburban dairy farms. The result agrees with the findings of Uddin *et al*. (2012); Dipu *et al*. (2019); Quddus (2012); Mutavi and Amwata (2018). The other noteworthy challenges were lack of awareness towards AI and non-availability of AI. The similar finding was observed in Sherpur, Jamalpur and Mymensingh district of Bangladesh and Karnataka state of India where 51% and 64% of the farmers, respectively stated that AI centre was far from their farms and they did not get a timely service (Quddus, 2012; Rathod and Landge, 2012). Rural farmers did not receive AI service: their cows were reared in open land with local bulls and naturally mated (Onono and Ochieng 2018). Most importantly, urban and suburban farmers indicated that they had no information about pedigree history of the bulls used for AI. The same constraint was observed by Quddus (2012) and Narayan *et al*. (2014). Skill of AI technician was not a constraint in this region.

Table 7: Constraints related to cattle breeding of farms in urban, suburban and rural areas of North-East Bangladesh

Constraints	Urban areas (n = 15)		Suburban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Non-availability of AI	39.8	4	32.8	7	71.9	1	53.5	5
Non-availability of pedigree bull	68.2	2	63.7	2	44.6	5	55.0	4
Lack of awareness towards AI	39.8	4	44.3	4	69.6	2	56.2	3
Problem in heat detection	60.0	3	62.4	3	53.5	3	57.5	2
Problem in proper timing of AI	73.8	1	75.9	1	51.1	4	63.2	1
Lack of skill of AI technician	33.8	6	35.5	5	28.3	7	31.6	6

The constraints of milk marketing are depicted in Table 8. Lack of marketing infrastructure (67.8%) was the main constraint in all three zones. Lack of milk co-operative society, low milk price, irregular payment by gawala (middleman) and absence of milk storage facilities were in the 2nd, 3rd, 4th and 5th rank, respectively. In north-east Bangladesh, no milk market infrastructure has been developed and no co-operative society has been formed, and all respondents of urban and suburban areas reported these as main constraints of milk marketing. The result coincides with the findings of Quddus (2012); Kumar *et al*. (2011); Cheelo and Van der Merwe (2021). In this region the farmers sold their milk to nearby sweet shops or to the local vendors. Some farmers sold their milk door-to-door in their areas. Conversely, in Australia, New Zealand, UK and USA milk marketing system is well established (FAO, 2011; Wouters and Lee, 2009). In these countries, farmers sell their milk to the dairy processors who process raw milk into different types of packaged drinking milk and dairy products, and distribute them into shops and for doorstep delivery (Khanal *et al*., 2018;

Bentivoglio *et al*., 2020). In India, Amul, the milk producers' co-operative society, collect farmers' milk communally and sell processed milk and milk products to different chain shops and wholesale markets (Prasad and Satsangi, 2013). Other constraints were poor bargaining power, with low milk price and irregular payment by middlemen for the farmers of all three areas. An organized milk market channel and milk co-operative society can improve milk price and the farmers' economic condition. The findings agree with those of Quddus (2012); Marma *et al*. (2019); Narayan *et al.* (2014). The farmers were also facing the absence of milk storage facility, in agreement with the results of Panchbhai *et al*. (2017).

Table 8: Constraints of milk marketing of dairy farmers in North-East Bangladesh

Constraints	Urban areas (n = 15)		Suburban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Lack of milk co-operative society	69.0	1	67.5	1	64.0	2	66.0	2
Lack of milk marketing infra-structure	66.0	2	67.5	1	68.7	1	67.8	1
Low milk price	46.0	3	45.7	2	48.0	3	46.9	3
Irregular payment by Gowala (middleman)	36.7	4	39.3	3	40.4	4	39.4	4
Absence of milk storage facility	32.3	5	30.0	4	28.9	5	29.3	5

The health management is crucial for successful running of dairy farms. As shown in Table 9, high treatment cost of diseases (67.0%) was the main constraint in all types of farms. Lack of credit (57.4%) ranked 2nd followed by lack of proper education on dairy farming (52.8%), unavailability of labour and high rate of wages (48.7%), lack of veterinary services (47.5%), unavailability of vaccine (43.3%) and diseases and disorders (34%) ranked 3rd, 4th, 5th, 6th and 7th, respectively. In urban areas lack of credit, unavailability of labour, and high wages were main problems. In sub-urban and rural areas high cost of treatment and lack of credit were the key constraints. Diseases and their treatment cost including veterinary services and medicine costs were important challenges for farmers. The results agree with findings of Quddus (2012), Marma *et al*. (2019); Onono and Ochieng (2018); Didanna *et al*. (2019). In urban and suburban dairy farms, most owners were dependent on hired labour, the cost of which affects the farm economy. The farmers cannot get credit from public banks and NGOS in this region. The lack of proper education in husbandry was another constraint. The same problems were discussed by Quddus (2012) in three districts of Bangladesh. The farmers were struggling to receive veterinary services and vaccines, owing to distance of facilities from the farms. The findings of present study are similar to the results of Quddus (2012); Uddin *et al*. (2012); Marma *et al*. (2019).

Table 9: Constraints of administrative and health management of urban, suburban and rural areas of North-East Bangladesh

Constraints	Urban areas (n = 15)		Suburban areas (n = 30)		Rural areas (n = 45)		Overall (n = 90)	
	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank	Garret's score	Rank
Lack of capital and credit facilities	65.2	1	53.7	3	57.2	2	57.4	2
Lack of proper education on dairy farming	45.6	4	52.2	4	55.7	4	52.8	3
High treatment cost of diseases	63.3	3	75.1	1	62.8	1	67.0	1
Unavailability of labour and high wages	63.7	2	62.8	2	34.4	7	48.7	4
Lack of veterinary service	38.5	6	38.7	5	56.3	3	47.5	5
Diseases and disorders	30.5	7	34.4	6	34.4	6	33.7	7
Unavailability of vaccine	44.8	5	33.3	7	49.6	5	43.3	6

The cattle of north-east Bangladesh suffered mostly from fever (16.2%), diarrhoea (15.5%) and parasitic diseases. The diseases were more prevalent in urban and suburban farms compared to rural household farms except Foot & Mouth Disease (FMD), which was more prevalent in rural areas. Other diseases and disorders were negligible. Among productive and reproductive disorders, mastitis, repeat breeding, postpartum anoestrus were most prevalent. The results agree with the findings of Maruf *et al*. (2012); Alam and Ghosh (1988); Suzuki (2005). The results are similar to the findings of Suzuki (2005); Uddin *et al*. (2012); Gillah *et al.* (2012).

Conclusions

Hygienic management with good husbandry practice with nutritional supplementation at transition periods would be beneficial for better production in high-yielding dairy cows. The dairy farmers of northeast Bangladesh are struggling to sustain their dairy business owing to constraints related to health and production. To overcome the current situation government should give incentives on cattle feed and credit facility with soft interest to the farmers; DLS and other organizations should arrange effective training on dairy farm management.

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