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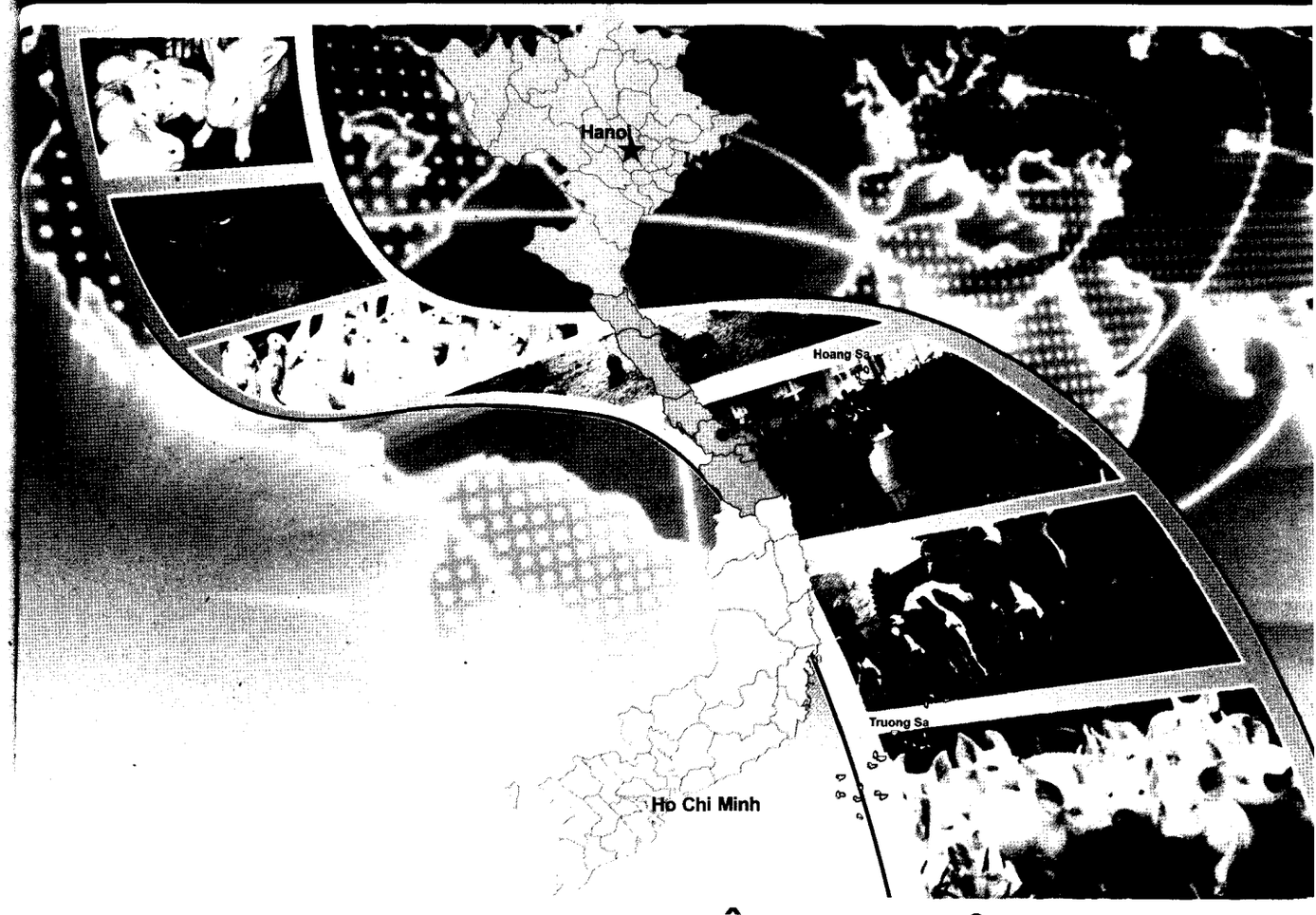

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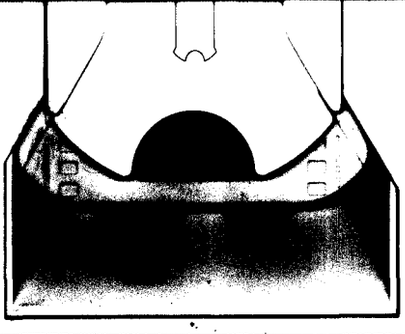

CHARACTERISTICS OF DUCK PRODUCTION SYSTEMS IN RED RIVER AND MEKONG RIVER DELTAS

Vu Dinh Ton[1*] *and Phan Dang Thang*[2]

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ABSTRACT

In Vietnam, the economic growth in recent years has brought a strong demand for animal products consumption, particularly poultry meat. This research aims to better understand how the factors in the duck sector adapt to current economic conditions in RRD and MRD by analyzing livestock farming systems with their various constraints. The research had been conducted by interviewing and production record keeping system at the household farms which have duck production at different scales in Hanoi Suburbs in RRD from December 2008 to November 2009 and Long An Province in MRD from March to August, 2007. Three duck production systems have been identified (1) industrial duck production system with high-yield potential imported races; (2) transhumant duck production system at semi-industrial scale with local or cross-bred ducks. Broiler or layer ducks are freely grazed or transhumant on rice fields for taking the residual paddy; and (3) duck production system at small scale or backyard production. Broiler duck farms have obtained weak productivity with high mortality rate. The net income has varied from 7,358,000 to 10,151,000 Vietnam Dongs per farm per year with broiler ducks and reproductive ducks at semi-industrial and industrial systems. Backyard duck farms are widely practiced in household farms with low investment. The net income of duck production is also weak in households (728,000 Vietnam Dongs per farm per year with broiler ducks and 1,368,000 Vietnam Dongs with layer ducks. Majority surveyed farms raised various species of chickens and ducks. Duck meat production also aims to satisfy a significant share of the demand for self-consumption with ducks in small households.

Keywords: *Duck production, epidemic risks, farming systems, family income, Vietnam*

1. INTRODUCTION

Vietnam is an agricultural country with around 67% of the total population currently living in rural areas. Vietnam has 11.8 millions of households in which about 70% of total rural households (or 8.3 millions) have the poultry production. Poultry production represents about 19% of total income of household; and the poultry meat occupies 15% of total meat consumption in families (VLSS, 2006; MARD, 2008). Duck farms represent 17% of rural households with about 2 millions of households. However, the risk of avian influenza on the poultry flock was large, particularly on the backyard farms with millions of animals destroyed, particularly in the period 2003-2005 (FAO, 2005). Up to this time, there are seven

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outbreaks of avian influenza in Vietnam causing more than 54 millions of poultry heads to be dead and culled in almost of North and South provinces, which occupied about 20% of total poultry population. In which, the first outbreak was happened from 11/2003 to 3/2004 in 57/64 provinces and cities with roughly 44 million of bird heads were death and culled (FAO, 2009; DLP, 2007; DAH, 2010). The loss caused by H5N1 virus was estimated about 3,000 billion VND (Vu Dinh Ton *et al.*, 2008; Peyre *et al.*, 2008). In 2012, the poultry flock occupied to 284 million of heads, increasing to 13% compared with 2008 but decreasing 12% compared with 2011 due to face competition of imported meat products (GSO, 2012). Duck flock represents 30% of poultry flock. The RRD and MRD play an important role in meat poultry production and providing chicks and ducklings for other provinces in the whole country. These regions represent the highest quantity of poultry flock in the whole country, making up about 46% of total poultry flock and 62% of duck flock (GSO, 2012).

In Red River and MRD, there are 80% of households raising chickens and 74% of households having ducks and 53% of farms who raise both chickens and ducks on a limitation surface (Vu Dinh Ton *et al.*, 2008). From early 2004, the producers had to adapt in the context of epidemic of the avian influenza for better responding the demand on the market. In fact, the research on the duck production basing on system approach and commodity chains is still limited, particularly the relation between the duck production systems with the epidemic diseases. Thus, this research aims to analyze the explicative factors of duck development in RRD and MRD through an identification of duck farming systems with their various constraints, including the diseases in these regions. In addition, this research aims at identifying the major risks of epidemic disease caused by H5N1 virus, the response of breeders facing the epidemic disease.

2. METHODOLOGY

Households who having poultry production at different scales in Hanoi Suburbs belong to RRD and Long An Province in MRD which represent the main duck production regions were selected for this research. In each province, we selected 3 districts basing on the agro-ecological patterns of the region and the diversification of duck farming systems. This research was conducted from December, 2008 to November, 2009 in Hanoi and from March to August 2007 in Long An.

The research began with the collection of poultry production data through official reports of the Department of Livestock Production (DLP), the FAO, the GSO, the Services of Veterinary, the Stations of Veterinary and from the discussions with the key persons and local authorities at the province, districts and the leaders of communes or villages in these research zones for a comprehensive understanding the poultry production in these provinces.

The various duck production systems and sub-systems were then identified; the research used random stratification method to select households who have duck production. Over 103 farms in Hanoi and 6 farms in Long An and veterinary agents were eventually interviewed, using a closed structure questionnaire. Information collection allows the characterization of the duck production (sub-) systems by the scale of breeding.

The survey data of duck farms from production record keeping system is analyzed by using MS Excel 2010. Financial analysis method is based on the concept of value-added the whole production processes involves the flow of inputs and outputs.

3. RESULTS AND DISCUSSION

3.1. Typology of poultry production systems

The scale of duck breeding and the type of duck production are really diversified and complicated in each ecological region. Most of economic activities of surveyed households are partly from poly-culture and animal production. Crop production aims to satisfy the demand of self-consumption and at buying a small overproduction. The cash income comes from animal production and extra-agricultural activities (Vu Dinh Ton *et al.*, 2010). In the MRD, the rice harvesting periods differ more from one province to another than in RRD. Transhumant duck production system aims at taking advantage of those different harvest times. Three main duck production systems according to the type of production and the risk level of epidemic disease are presented in Table 1.

Table 1 Typology of duck production systems in Red River Delta and Mekong Delta

Ducks production systems	Sub-systems of duck production	Size of duck production (heads /farm/year)	Producers (% of rural family) *	Production (% of products) *
FS1. Industrial duck production system	Broiler imported ducks (n=22)#	250 - 1,000	< 10%	10 - 20%
	Reproductive ducks (n=18)	120 - 350		
FS2. Transhumant ducks at semi-industrial scale	Broiler transhumant ducks (n=30)#	500 - 10,000	70%	40 - 55%
	Layer transhumant ducks (n=52)#	300 - 1,500		
FS3. Backyard duck production system (n=34)#		80 - 200	20%	15 - 25%

*Notes: * Calculation by the data of report of Department of Livestock Production (DLP, 2006); and General Statistics Office of Long An and Hanoi Provinces (2009).*

 # In 2007, research results in MRD based on 10 farms of broiler CV Super M; 14 farms of broiler transhumant ducks; 15 farms of layer transhumant ducks; and 12 backyard farms.

3.1.1. Industrial duck production system (FS1)

The industrial duck production system keeps regularly imported ducks such as French Muscovy ducks, CV Super Meat using industrial feed. Broiler and reproductive ducks are both confined and grazed in personal fields. These duck breeds are popularly raised in Phu Xuyen District of Hanoi. Only reproductive ducks are sometimes vaccinated with some types of vaccines such as viral hepatitis and cholera of ducks. In addition, there are some different flocks of reproductive birds such as hens, CV Super M and French Muscovy ducks in the same farm. They are raised together within a limited area.

3.1.2. Transhumant ducks at semi-industrial scale (FS2)

Transhumant duck production systems at semi-industrial scale are strongly developed in MRD. This duck production is highly seasonal and relation with rice production. In MRD, there are from 2 to 3 rice production cycles a year. The ducklings can be brought to the rice fields just after rice transplantation to control pest. And the ducks are brought back to rice fields during the days just after harvest for taking the residual paddy (Desvaux *et al.*, 2008). In RRD, the duck flocks are moved in the rice-fields in the same commune or some communes in the district. In this system, it

seems that a lot of crossing had happen between local and imported high productivity breeds like Super Eggs, Bau Canh Trang. The broiler and layer ducks are freely grazed in farmers' privately-owned allotments or transhumant on rice fields for taking the residual paddy. Especially, the hen-houses of broiler transhumant ducks are very limited or inexistent.

3.1.3. Backyard duck production system (FS3)

Village/backyard duck production systems are low investment, free ranging with local breeds such as Vit Bau, Bau Dat or some cross-bred as Bau Canh Trang. Normally, the ducks are not vaccinated. Farmers use different poultry breeds in the same farms.

3.2. General characteristics of poultry production systems

The semi-industrial duck production began in early 1990s, however industrial duck production started much later, in 2000s. The farmers typically have only from 6 to 12 years experience of poultry production. The average age of household head is from 41 to 46 years old. In general, each household has two main familial labors for keeping the duck. However, in backyard duck production system, the head of the farm is more than 50 years old and some young farmers are about 30 years old. A small part of products is directly consumed in the family during different celebrations and the other major part of duck is sold to earn some income in cash. Thought all of duck production systems, the potential resources of economic households are weak, particularly transhumant duck farms in MRD (Table 2).

Table 2. General characteristics of duck production systems in Red River and Mekong Delta

Characteristics	System FS1	System FS2	System FS3
Scale of production per year	About 150 reproductive ducks; 500 broiler ducks	About 550 layer ducks; 2,600 broiler ducks	15 layers, 60 broiler ducks
Duck races	CV Super M, French Muscovy ducks	Super Egg, Bau Canh Trang	Local breeders
Source of day old duckling	Private farms	Private farms /farms themselves	Village markets or themselves
Duck kept	Gardens and indoors with reproductive and broiler ducks	Transhumant with layer ducks and broiler ducks	Outdoors
Source of feed	Industrial and mixed of industrial with paddy, maize	Mixed of industrial with paddy, maize	Agricultural by-product
Duration of breeding	2 months with Super M; 3 months with Muscovy ducks Repro. Super M, French Muscovy ducks: 12-14 months	Broiler ducks: 2.2 months Layer Ducks: 18 - 26 months	Broiler ducks: 2.3 months Layers: 22 months
Mortality rate	10 % with CV Super M; 21 % with broiler French Muscovy ducks; 16% with CV Super M and French Muscovy ducks	12% with broiler ducks; 10 % with layer ducks	15% with broiler ducks; 20% with layer ducks
Contact with other birds	None	Yes	Yes
Preventive sanitary (vaccine, disinfectant)	Some vaccines with reproductions	Some vaccines with layers, No vaccines with broiler ducks	Not vaccines
Surface of fields and gardens	2,000 - 4,500 m²/farm	1,500 - 2,000 m²/farm	1,000 m²/farm

The imported ducks with high productivity such as CV Super M, French Muscovy ducks are commonly kept in the area of farm or in garden and fish ponds. In RRD, an integrated production between fish and ducks are strongly raised in some provinces, particularly the production of CV Super M and Muscovy ducks in Phu Xuyen District. The cross-bred, local breeds and layer ducks are grazed on rice fields or raised transhumant from this rice-field to another. Normally, the broiler or layer ducks are not isolated from other domestic animals. The breeding duration is short with broiler ducks. In the system 3, there are different types of chickens and ducks in very small scale farms. The day old ducklings are bought in local farms or produced in the same farm such as local Muscovy ducks. The breeding duration is long and the duck feed comes from by-products of the farm.

In industrial duck production system, the farmers have to invest very strongly for duck feed and price of ducklings. In the semi-industrial systems, after harvests, the ducks are kept in rice fields for following the harvest periods in the different provinces in the MRD. In this period, the ducks do not receive industrial feed. In both regions, farmers build very simple tents for ducks staying at night and layer egg.

In the backyard duck production, most households adopt these systems to raise duck and other poultry around their residence or in various areas surrounding the village. The small farmers don't purchase of ducklings and any feed. The agricultural products or by-products of the farms were usually used for the ducks.

3.3. The implicit risks in duck production

3.3.1. Source of day old ducklings

In industrial duck production raised at the beginning of 2000's, poultry research centers played an important role for supplying household farms in day old ducklings. Therefore, the origin and the quality of day old ducklings were well controlled. But the quantity of ducklings is really limited for satisfying of producers. The demand of day old ducklings from breeders is really high by the demand of duck meat in the domestic market. Since then, the explosion of private hatching incubator made this production out of control of appropriate authorities.

In fact, day old ducklings are mainly supplied from private hatching farms of duck eggs in which parents are the same as of the commercial duck production farmers. Particularly, ducks and Muscovy ducks are mainly kept in the Phu Xuyen District, and then these ducklings are sold to farmers of many provinces. There are 90% of household farms who bought day old ducklings from private hatching farms or local markets. Only 10% of household farms in these systems bought day old ducklings from poultry research centers. Thus, the technical and scientific knowledge of breeders depends on the system of private hatching farms. The risk of epidemic disease is high in those private hatching farms due to the lack of control from authorities; and the parental duck flocks are not vaccinated against the epidemic diseases. In the backyard farms, day old ducklings are bought in the same village or are brooded at the same farm households which still occupied an important role.

Currently, the duckling resources are largely depended on unofficial imports from China such as the breeds of Bau Canh Trang duckling, Zhejiang layer duck through the private hatching farms in Phu Xuyen in RRD and some private farms in Long An in MRD.

3.3.2. Feed source and the knowledge of producers

The industrial duck production system used industrial feed for raising ducks, in which 80% to 100% of the diet for French Muscovy ducks, CV Super Meat. Costs of industrial feed represent a part the highest in production structure. In transhumant duck production

system, the industrial feed is used from 40% to 70% of the diet for broiler and layer ducks. Nowadays, in MRD, the number of rice cycles is increasing from 2 to 3 cycles per year, the period for duck to access to rice field is reduced. Furthermore, the massive use of pesticides and herbicides on rice fields reduces the quantity of feed available for ducks (insect, small fish, crab...). So, farmers have to supplement with more feed, especially in RRD. Since the farmers tend to choose exotic breeds with higher productivity compared with the local breeds have low productivity. Agricultural by-products only played a central role in duck production at small scale in system 3. The fluctuation of feed price is disadvantage with farmers in the crisis period of food and finance in the world at present.

The technical and scientific knowledge of the breeders are still poor among the whole systems. In particular in transhumant duck production and backyard systems, there are only 10% of household's head in RRD and fewer than 3% in MRD who had ever participated in a course talking about the breed expansion. The producers only improved their knowledge from their accumulated experiences and from the marketing program of veterinary enterprises.

The use of antibiotics is popular in poultry production in the whole farming systems for treating sickness of poultry flocks. In this research, there are 70% of farmers in these systems buy themselves medicines to treat their birds with an average duration from 3 to 5 days. If the birds couldn't be survived after this duration, the sick adult bird is mainly sold at low prices to consumers through intermediaries (equal from 25% to 50% of the normal prices). The dead ducklings are thrown out in public rivers, ponds or rice-fields.

3.3.3. Vaccination and the avian influenza epidemic risks

The Vietnamese Government used the vaccination program against HPAI on poultry flock caused by H5N1 virus such as a good effective tool to deal with this epidemic disease in Vietnam. This is based on the support of political systems (Communist Party, Authorities and social organizations at various levels...) and social popular organizations for implementing effective preventive measures. Vaccines are imported and given to the provinces and then distributed to districts and communes. The birds are vaccinated two doses per campaign for layer, breeders in some provinces in South but one dose in most of province in North. The broilers, having a life cycle below 60 days are vaccinated one single dose.

Many poultry herd were infected with HPAI caused by H5N1 virus in the first and second outbreaks of 2003 - 2005. After the avian influenza outbreaks in Vietnam, a large number of farms had been vaccinated for some birds' diseases such as Newcastle, Gumboro and against avian influenza. In whole systems of duck production, the layer ducks are sometimes vaccinated before layer period; especially these birds are not vaccinated during the layer period. In addition, the broiler ducks are often not vaccinated by a schedule and the ducks in the backyard system are not vaccinated. However, still many birds were found infected by H5N1 virus after the vaccination campaigns against avian influenza. The epidemic risks in poultry often happened from this year to another in research communes from 2005 to present. The effect on vaccination campaign is still dependent on the policy economic conditions of each province.

3.3.4. Economic efficiency in poultry production

Over 86% of birds of systems are sold to intermediate agents in each region or some small special poultry markets around Hanoi or Long An Province. In MRD, the eggs or living ducks are transported to some private

slaughter-houses in Ho Chi Minh City. The number of ducks reserves for farmer's self-consumption demands in system 3 occupies to 60% in Long An and 40% Hanoi. However, the transport and slaughter of living ducks is relatively very small. It is difficult to control the epidemic disease and the quality of duck products.

Economic results in these systems are very unsettled (Table 3). The broiler or reproductive duck production has an important income with about 7,358,000 VND per farm per year with broiler CV Super M to 10,151,000 per farm per year with French Muscovy duck. But many layer ducks are loss-making due to epidemic disease and the great fluctuations of prices of input and output in duck production. The net income of layer ducks represents 4,027,000 VND per farm per year. Some layer duck farms use eggs for producing the embryo eggs with higher income. Many layer duck farms lost up to 90.6 million VND/year in layer ducks.

Table 3 Family income of broiler and reproductive duck production systems

Unit: 1,000 VND/flock

Items \ Systems	System 1. Industrial duck production			System 2. Transhumant duck production		System 3. Back yard duck production	
	CV Super M (n=10)	French Muscovy ducks (n=12)	Reproductive ducks (n=18)	Broiler ducks (n=30)	Layer ducks (n=52)	Broiler ducks (n=24)	Layer ducks (n=10)
Ducks /flock (heads)	250	195	198	410	550	27	15
Production (kg/flock)	623	435	-	772	-	52	-
Gross output	18,756	16,670	102,073	22,615	335,570	1,537	12,797
Intermediate costs	17,033	12,237	91,694	20,898	322,864	1,214	10,199
Ducklings	1,358	1,034	1,421	2,486	10,490	162	134
Feed cost	15,364	10,915	88,933	18,191	310,922	1,041	9,958
Veterinary	240	202	1,202	153	1,188	10	108
Energy	71	87	139	68	264	0	0
Value-added	1,723	4,433	10,379	1,712	12,706	323	2,598
Amt	300	456	976	308	1,138	51	99
Net value-added	1,423	3,976	9,403	1,404	11,568	272	2,499
Redistribution							
Financial costs	344	266	493	128	479	0	0
Land-tax	15	10	119	8	64	0	0
Income /head	4.3	12.7	27.0	3.0	23.0	11.9	158.0
Income /flock	1,063	3,701	8,791	1,269	11,025	272	2,499
Income /family labor /year	3,679	4,150	3,489	4,201	2,448	350	605
Income/farm/year	7,358	10,151	7,411	8,130	4,027	728	1,368
(min - max)	(-18,953 - 74,053)	(-5,232 - 42,830)	(-17,160 - 46,974)	(-28,166 - 144,185)	(-90,679- 109,315)	(-1,648 - 3,260)	(-5,014 - 5,807)

4. CONCLUSION

There are three major duck production systems practiced in Hanoi and Long An Provinces (1) Industrial duck production with imported high potential productivity breeds, (2) Transhumant duck production at semi-industrial with cross-bred breeds and taking the residual paddy after harvest times, and (3) Backyard duck production system with local or cross-bred breeds for self-consumption in households and one part for the local market.

Majority surveyed farms raised various species of chickens and ducks. This is to permit a better risk management and responds to varied market demand according to different consumer tastes. The mortality rate is high, between 12% with transhumant broiler ducks and 21% French Muscovy ducks. Economic results in these systems are very unsettled, the industrial duck production has a higher economic efficiency; nevertheless transhumant layer ducks and transhumant broiler ducks are loss-making caused by large fluctuation of prices of inputs, outputs and epidemic diseases in duck production. In addition, the raising is very intensive but the technical and epidemic sanitary knowledge of the breeders are still limited. It is a cause of epidemic diseases to the duck breeding.

In addition, the major proportion of day old ducklings is provided by private hatching farms; nevertheless the control process of these household farms is still insufficient. Therefore, it is very difficult to control the epidemic disease on the duck flocks and other animal production.

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