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Disease awareness of the poultry keepers in Switzerland and their access to information concerning highly pathogenic avian influenza

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Abstract

The passive surveillance of highly pathogenic avian influenza (HPAI) in domestic poultry is based essentially on the reporting of suspicious clinical cases by the poultry keepers to the veterinary services. As little was known about HPAI disease awareness among Swiss poultry keepers, a cross-sectional study was conducted among poultry keepers in Switzerland in 2007. For data triangulation and complementary information, interviews have been conducted with experts of poultry marketing organizations. The main information source used by the poultry keepers was mass media. Having a non-commercial poultry husbandry was significantly associated with lower knowledge scores. Non-commercial poultry keepers felt neglected by the veterinary authorities. Risks perceived by the poultry keepers reflected well the officially communicated risks for HPAI introduction. By highlighting the needs and the knowledge level of the poultry keepers, we make recommendations with regard to more efficient information exchange between poultry keepers and veterinary authorities. The main challenge will be to consistently integrate non-commercial poultry keepers in the formal information channels.

Keywords: highly pathogenic avian influenza (HPAI), awareness, perception, poultry keepers, Switzerland

Krankheitsbewusstsein von Geflügelhaltern in der Schweiz und Informationsbeschaffung über die hochpathogene Aviäre Influenza

Die passive Überwachung der hochpathogenen Aviären Influenza (HPAI) bei Nutzgeflügel beruht vor allem auf der Meldung klinischer Verdachtsfälle durch Geflügelhaltende an die Veterinärbehörden. Da wenig darüber bekannt ist, wie Geflügelhaltende in der Schweiz die HPAI-Gefahr wahrnehmen wurde eine Querschnittsstudie unter Geflügelhaltenden in der Schweiz in 2007 durchgeführt. Zur Datentriangulation und für weiterführende Informationen wurden Interviews mit Experten von Geflügelvermarktungsorganisationen geführt. Es stellte sich heraus, dass Geflügelhalter hauptsächlich über Massenmedien Informationen erhalten. Teilnehmende mit nicht-gewerblichen Geflügelhaltungen hatten signifikant geringere Kenntnispunktzahlen und fühlten sich häufig von den Veterinärbehörden vernachlässigt. Was die Risikowahrnehmung betrifft, so deckten sich die Einschätzungen der Risiken durch die Geflügelhaltenden generell gut mit den offiziell kommunizierten Risiken für eine Einschleppung von HPAI. Mit Hilfe der erfassten Bedürfnisse der Geflügelhaltenden, sowie der Einschätzung ihres Wissensstandes, wird insbesondere empfohlen, den Informationsaustausch zwischen Geflügelhaltern und zuständigen Veterinärbehörden auf kantonaler und nationaler Ebene zu fördern. Die hauptsächliche Herausforderung besteht darin, die nichtgewerblichen Geflügelhalter dauerhaft in offizielle Informationswege einzubinden.

Schlüsselwörter: hochpathogene Aviäre Influenza (HPAI), Bewusstsein, Wahrnehmung, Geflügelhalter, Schweiz

Introduction

Highly pathogenic avian influenza (HPAI) in poultry, also known as fowl plague, is a viral disease with high economic impact (Davison et al., 1999; Fasina et al., 2008). Switzerland is declared free of AI in its domestic poultry population since 1931. In 1997, H5N1, a new HPAI virus having zoonotic potential, appeared in Hong Kong and spread subsequently since 2005 from Asia to Europe causing several outbreaks in poultry, for instance in England, Germany, France and Hungary (EFSA, 2008). The outbreaks in Europe occurred in different types of poultry husbandries with regard to location, production system, professionalism, and poultry species kept. To detect low and highly pathogenic avian influenza (AI) viruses early and to maintain the status of freedom from HPAI in domestic poultry, Switzerland is carrying out active monitoring programs and has a passive surveillance system in place (BVET, 2008). Passive surveillance relies essentially on livestock keepers reporting suspicious clinical signs in their poultry (Lilienfeld and Stolley, 1994). Prompt notification of suspicious cases of any OIE and/or nationally notifiable epidemic disease to the veterinary authorities, via a veterinarian, is mandatory for everyone keeping, handling, or treating animals (Schweizerischer Bundesrat, 2008). The broad participation in a passive surveillance system facilitates a performance at rather low cost because it is continuously in place and operational wherever livestock is kept. However, its effectiveness strongly depends on the livestock keepers' disease awareness and whether they comply with their obligation of prompt reporting of suspicious cases. Good disease awareness stands for having an adequate knowledge of the related clinical manifestations. This is particularly challenging in the case of HPAI where symptoms are manifold or even absent and differ between the disease-causing virus strains and the poultry species affected (BVET, 2008). Disease awareness further implies realistically assessing relevant pathways for pathogen introduction into poultry farms, avoiding risky behavior. Building and maintaining disease awareness for HPAI, which has not been emerging for decades in Switzerland, requires a specific information policy. The Swiss Federal Veterinary Office (FVO) names it a «central and rewarding task» to inform livestock keepers, veterinarians, and the general public on epidemics (Falk, 2005). Thus, the FVO provides free information material on HPAI, available on the FVO homepage and as print-outs in German, French, and Italian language (BVET, 2008). Further, H5N1, more popularly called «bird flu», had high media attention. Many institutions, whether scientific or not, have made information available and affordable to anyone. However, not all information is adequate for poultry keepers, and not all sources are regularly accessed by them.

Only few epidemiological investigations (for instance Lovis et al., 2008) focused on risk perception and disease awareness among livestock keepers in Switzerland. For poultry keepers, a complicating factor to set-up a study was the unknown number and diversity of poultry keepers in Switzerland, as non-commercial husbandries were only registered systematically since October 2005 (Schweizerischer Bundesrat, 2006). Representative information on the poultry keepers' HPAI awareness and their information sources accessed was not available. Data on these aspects are needed: One may assume that passive HPAI surveillance will remain crucial or even gain importance in Switzerland and internationally given its financial and strategic benefits.

The present study aimed at identifying needs and gaps in the passive surveillance system for HPAI in Switzerland and at suggesting actions for improvement by 1) depicting the perceived information quality and the needs on information of poultry keepers, by 2) determining the sources of information accessed by the poultry keepers, by 3) assessing their level of knowledge on HPAI and its influencing factors, and by 4) providing an insight into the risk perception of the poultry keepers in Switzerland.

Material and Methods

Study

From August to December 2007 a cross-sectional study concerning AI surveillance was conducted among poultry keepers in Switzerland. The sampling frame consisted of a total of 49'437 countrywide identified commercial and non-commercial poultry keepers. For the purpose of a single list of poultry keepers in Switzerland the so called AGIS-database (agricultural information system) by the Federal Office for Agriculture (FOAG) and the cantonal agricultural offices (Bundesamt für Statistik (BfS), 2007 a, b) were aggregated with entries of poultry husbandries registered on a cantonal level (Kernen, 2008). A random sample of 3'978 keepers was drawn proportionally to the square root of the number of poultry kept on a farm, to ensure a sufficient number of the less numerous larger poultry farms.

A structured questionnaire with closed and open questions was developed together with epidemiologists, experts from the poultry sector and from the FVO, as well as ornithologists. The questions covered general characteristics of poultry husbandry, the observation of wild birds, trading contacts to other poultry farms, and, focus of the present article, the disease awareness of the poultry keepers and their access to relevant information as to AI. Throughout the questionnaire the colloquial term «bird flu» was used to address the disease. The questionnaire was translated from German to French and Italian and was sent out to poultry keepers in all cantons of Switzerland. Data of the returned and completed questionnaires (39 % response rate, n = 1'560) were double-entered into MSAccess®, compared and cleaned in EpiInfo® and analyzed using Intercooled Stata 9.1®. Further, five guided interviews

have been conducted with experts of poultry marketing organizations (integrating companies) for checking the coherence of the collected data (data triangulation) and to complement information on information channels used within commercial poultry production.

Analysis

Qualitative data

To assess the needs and concerns, the poultry keepers were asked whether they felt well informed or not and which further information they desired. A semi-quantitative analysis was performed by pooling similar narrative statements into three categories: sought information and needs, criticisms on accessed information and suggestions for improvements. The protocols taken during the interviews with experts from poultry marketing organizations were transcribed and underwent content analysis.

Scoring

A «knowledge score» and a «perceived risk score» have been introduced to rate the respondents' answers on knowledge and their risk estimations for AI introduction into the Swiss poultry sector via different routes, respectively. The «knowledge score» was calculated based on four questions (Tab. 2) by giving 2 points for a correct answer, 1 or 0.5 points for a partly correct answer, 0 point for a wrong or a «I do not know» answer. Thus a maximum of 8 points could be obtained indicating highest level of knowledge. The «perceived risk score» of AI introduction in the poultry sector was assessed with participants' estimations of the probability of 9 different routes of introduction qualified by «high», «medium», «small», «insignificant», or «I do not know». Four points were assigned to «high», 3 to «medium», 2 to «small», 1 to «insignificant» and 0 to «I do not know».

Analysis of scores

The knowledge score was categorized into: category 1 if score ≤ 2, category 2 if score 2 < and ≤ 4, category 3 if score 4 < and ≤ 5 and category 4 if score ≥ 5. These categories were introduced to show general trends rather than smooth differences. A multinomial model with the outcome of categorized scores was used to investigate the following explanatory variables: i) the three language regions, ii) the level of professionalism, iii) the kept poultry and iv) the information sources.

Results

Participants

In the general part of the questionnaire, 1'482 participants classified their husbandry into «commercial» (626, 42 %) or «non-commercial» (856, 58 %). Participants lived mainly in German speaking parts of Switzerland (1'167, 79 %), but also in French (280, 19 %) and Italian speaking parts (35, 2 %). Further details on the participants' characteristics are shown in Table 1 and in an analysis report for poultry keepers (Fiebig and Saurina, 2009).

Table 1: Participant groups (commercial and non-commercial) and their characteristics (language of participant, number of poultry kept, flock composition).

	«Commercial»	«Non-commercial»	Total
	n = 626 (42.2 %)	n = 856 (57.8 %)	n = 1'482 (100 %)
Language of participant			
German	494 (78.9 %)	670 (78.6 %)	1'167 (78.7 %)
French	130 (20.8 %)	150 (17.5 %)	280 (18.9 %)
Italian	2 (0.3 %)	33 (3.9 %)	35 (2.4 %)
Number of poultry kept			
Median (IQR[1])	4'500 (6'992)	15 (22)	40 (3'838)
Flock composition	relating to n = 621	relating to n = 849	relating to n = 1'470
No water bird kept	585 (94.2 %)	670 (78.9 %)	1,255 (85.4 %)
Pure water bird flock	0 (0.0 %)	20 (2.4 %)	20 (1.4 %)
Mixed flock with water birds	36 (5.8 %)	159 (18.7 %)	195(13.3 %)

[[1]IQR : Interquartile range]

Perceived information quality and needs on information

Eighty one percent of the respondents stated being well-informed about «bird flu», 14 % felt that they were not well enough informed and 5 % replied that they did not know whether they were sufficiently informed. No significant differences in perceived information level were seen between commercial and non-commercial keepers, the language regions and the different information sources (data not shown). Out of a total of 134 respondents, who did not feel well-informed, two-thirds provided narratives. More than 55 % were classified as needs, close to 20 % as criticisms and more than 16 % as suggestions for improvement. Nine percent could not be classified.

Needs

The respondents asked for detailed information about the infectious agent, its survival strategies, its transmission pathways and in particular (47 % of all comments) the symptoms in the different poultry species. More than 15 % of the respondents wanted more information on protection and preventive measures, which can be implemented by laypersons. Results of risk analyses done by the veterinary services and the success of preventive measures in place were requested by another 5 %. Further, some poultry keepers were interested in receiving more information on the number of birds that died in Switzerland due to «bird flu» and the number of poultry slaughtered because keepers were unable to confine their animals. Close to 3 % of respondents stated that there was too little information about the danger for humans and/or about risk of AI introduction via wild birds.

Critics

Media in particular but also veterinary authorities were criticized by respondents' as shown in the following remarks:
«[The poultry keepers] do not know whom to trust and which information is distorted by the media»; «If something marginal happened, it will be exaggerated by the media»; «[The keepers learn] too much from the mass media and too little from the FVO and the cantonal veterinary offices»; «[Keepers would like] more objectiveness and less hysteria».

Suggestions

The main proposition of the respondents was a more coordinated information strategy. They made suggestions for an optimized communication such as «Information from one center and targeted at the professionals [would be beneficial]». This central office should update the keepers on a regular basis on the current situation in the region, either by e-mail, personal communication, or the professional journal («Schweizerische Geflügelzeitung») as pointed out in the following citations: «[Poultry keepers want] regular reports as to where the risk is the highest»; «Half-yearly situation reports from the cantonal veterinary office [are desired]».

Sources of information accessed by the poultry keepers

The main source of information for Swiss poultry keepers was the mass media for 68 % and 88 % of commercial and non-commercial poultry keepers, respectively. In contrast to non-commercial poultry keepers, the second most used source of information for commercials was the commercial associations (50 %) (virtually all commercial farms were integrated in poultry marketing organizations) and commercial journals (50 %). Twenty-two percent and 31 % of respondents received information from the federal and the cantonal veterinary office, respectively.
«Professional associations» played an exceptional role among the information sources. In contrast to other sources, counseling from commercial associations requires membership and a consistent mutual commitment of poultry keepers and associations. The interviews with experts showed that the associations were actively and regularly informing their members on HPAI and other relevant topics of poultry health. The frequency of updates depended on the epidemiological situation in Switzerland and surrounding countries, but was always more frequent than once per year. All associations have used more than one channel for disseminating the information. Mostly, newsletters were sent by mail and/or delivered together with the accounts to egg producers. Annual producer meetings were optional, but well attended. Consultants and/or veterinarians from the associations were visiting all member farms regularly (several times per year), and additional visits were organized on the poultry keepers' request. Experts were available to the members by telephone all day or even around the clock. With regard to the content of information, the experts were drawing on own experiences, on legal texts, and on recent and scientific publications. Their professional network involved cantonal and national veterinary services, Swiss and international poultry experts and the Aviforum, the Swiss aviculture education, research, and service centre. All experts affirmed that with all their member farms at least a baseline information exchange on HPAI was guaranteed.

Level of knowledge on HPAI and its influencing factors

The mean score of the knowledge level was 3.1 with a minimum of 0.5 and a maximum of 8 points. This distribution of participants' score results has been taken into account for the categorization. Multinomial regression

analyses resulted in «living in the French speaking region», being a «commercial keeper», «keeping only chicken» and getting information from «professional journals» and affiliation to «marketing organization» being explanatory variables which were significantly associated with a higher knowledge level (category 2–4) of respondents.

Table 2: Distribution of the answers given to the four questions and allocated points used to calculate the knowledge score.

Question		Number	Percent	Points
Please assess: bird flu and…		n = 1'158		
…flow plague…	are the same	143	12 %	2
	are similar	201	17 %	0
	are different	343	30 %	0
	I do not know	471	41 %	0
…Newcastle disease…	are the same	2	<1 %	0
	are similar	75	6 %	0
	are different	324	28 %	2
	I do not know	757	65 %	0
…the yearly human flu…	are the same	7	1 %	0
	are similar	224	19 %	1
	are different	607	52 %	2
	I do not know	320	29 %	0
Bird flu situation in Switzerland:		n = 1'486		
In the past 5 years did any case occur in commercial poultry?	Yes	239	16 %	0
	No	1'057	71 %	2
	I do not know	190	13 %	0
Symptoms:		n = 1'418		
Which of the following symptoms make you suspecting a bird flu infection in chicken?				
	Coughing	143	9 %	a
	Poor eating and drinking	403	28 %	a
	Scrubby plumage	217	14 %	a
	Lameness	156	10 %	a
	Loss of coordination	185	12 %	a
	Abnormal eggshells	54	4 %	a
	Cannibalism	5	<1 %	a
	Diarrhea	166	11 %	a
	Unexplained death of several animals	1'321	87 %	a
	Vomiting	22	1 %	a
	Sneezing	87	6 %	a
	Decrease of egg production	179	11 %	a
	Decrease of growth	37	2 %	a
	Swollen head and crest	185	12 %	a
	Paralysis	164	11 %	a
	Abnormal movement of the head	125	8 %	a
	I do not know	143	9 %	0

Which poultry species do(es) not show any obvious and typical symptoms?				
	All poultry species show obvious symptoms	752	53 %	b
	Chicken	32	2 %	b
	Duck	52	4 %	b
	Quail	19	1 %	b
	Turkey hen	12	1 %	b
	Partridge	20	1 %	b
	Guinea fowl	18	1 %	b
	Ostrich	63	4 %	b
	Goose	37	3 %	b
	I do not know	550	39 %	0

a

5 and more symptoms checked	198 (13 %)	2
3 – 4 symptoms checked	328 (21 %)	1
1– 2 symptoms checked	892 (58 %)	0.5
No symptom checked	8 %	0

b

If duck and goose	29 (2 %)	2
If duck or goose + and others	37 (3 %)	1
If one other	1'361 (95 %)	0

The French speaking region being associated with higher knowledge scores when compared to the German and Italian speaking regions could not be explained by a different distribution neither of professionalism nor of information sources. The questions asked on HPAI and detailed results are provided in Table 2.

Risk perception of poultry keepers

The respondents probability weighting for nine different routes of AI introduction resulted in highest perceived risk scores (possible from 0 to 4) for «Migratory birds» between 2.9–3.3 (overall mean 3.1) and for «Live poultry» between 3.0–3.4 (overall mean 3.2) with non significant differences between types of professionalism and the region (Tab. 3).

Discussion and conclusions

This is the first large-scale study addressing the disease awareness of the poultry keepers in Switzerland and their access to information concerning HPAI with the overall goal to identify needs and gaps in the passive surveillance system for HPAI in Switzerland. The investigation of the poultry keepers' perceived information quality, their stated needs, and the sources of information they access basically confirmed that there were various information sources available. Access to comprehensive and high quality information differed between respondent groups. Commercial poultry keepers were integrated in the information policy of their marketing organization whereas non-commercial poultry keepers mostly had mass media as principal information source and were not affiliated to a marketing organization.

The investigations related to the poultry keepers' disease awareness highlighted both an adequate knowledge level of the participants for several HPAI related topics, and gaps on other topics. Good knowledge was evident in the part on risk perception. The outcome that «migratory birds» and «live poultry» were determined as most probable pathways for HPAI introduction went in line with official risk assessments. This supported a successful risk communication on that topic. The need for enhanced awareness training and communication on topics such as clinical manifestations of HPAI in different poultry species and on preventive measures was identified in the written statements and by the knowledge questions. Non-commercial poultry keepers had comparatively lower knowledge score outcomes than commercial poultry keepers which can partly be explained by their presumed training background and by the limited information sources accessed. Interestingly, the majority of the respondents felt to be well-informed, whereas the results of the analysis of the knowledge level did not generally

Table 3: The mean of the «perceived risk score» is shown for type of professionalism level and language region with the rank in brackets. The minimum possible score was 0 and the maximum 4. Because of the too few data from the Italian speaking region, no summary statistics were done. The number in [] displays the ranking of the «perceived risk score» for each topic.

		Live poultry	Migratory birds	Tourism	Poultry product	Animal feed	Bio-terrorism	Other animal species	Wind	Other options
mean risk (0–4)	All keepers	3.2 [1]	3.1 [2]	2.4 [3]	2.3 [4]	2.1 [5]	1.4 [6]	1.4 [6]	1.4 [6]	0.9 [9]
	Commercial	3.4 [1]	3.3 [2]	2.8 [3]	2.4 [4]	2.0 [5]	1.6 [6]	1.6 [6]	1.6 [6]	1.2 [9]
	Non-commercial	3.0 [1]	2.9 [2]	2.1 [4]	2.2 [3]	2.1 [4]	1.4 [6]	1.2 [8]	1.3 [7]	0.6 [9]
	German speaking	3.2 [1]	3.0 [2]	2.4 [3]	2.3 [4]	2.1 [5]	1.5 [6]	1.4 [7]	1.4 [7]	1.0 [9]
	French speaking	3.1 [2]	3.3 [1]	2.3 [3]	2.1 [4]	2.0 [5]	1.3 [6]	1.2 [8]	1.3 [6]	0.3 [9]

support this self-concept. One can therefore not assume that every poultry keeper would actively and specifically search for further information.

The presented study was done to obtain an overview among all types of poultry holdings. It could be assessed that respondents and non-respondents did not differ significantly with regard to geographical region, flocks size, and poultry kept. The questions used for the knowledge score were posed in a simplistic way and might have been ambiguous to very well informed participants. Furthermore, it was not possible to validate if keepers used external help while completing the questionnaire and thus achieving a higher knowledge score result. However, for the purpose of this study, it did not matter if keepers knew where to look or whom to ask. For an in-depth understanding of single items and their influencing factors, complementary qualitative investigations among poultry keepers would be an asset. A close collaboration between authorities, veterinarians, and poultry keepers is essential for rapid reporting (OIE, 2004) and requires the continuous exchange of concerns and opinions. Those benefiting from a well functioning disease surveillance, namely poultry keepers, commercial organizations, veterinarians, federal and cantonal veterinary authorities, should share knowledge intensively, and communicate proactively with members of the media to provide effective and coordinated information to the public and more specifically to the poultry keepers (Abbate et al., 2006). This can help to avoid both inattentiveness and panic mongering.

Needs and gaps identified in the present study can impinge upon the current performance of passive HPAI surveillance in Switzerland and should therefore be addressed by veterinary authorities. First, it is essential to record all poultry keepers in an updated database, useful for the surveillance and control of any poultry related and zoonotic disease. Only then high quality and well tailored information material such as the produced and already distributed video «Bird Flu: Prevent now!» (BVET, 2009) can reach poultry keepers all over Switzerland without delay. A particular challenge for veterinary services remains to fully integrate non-commercial poultry keepers in the information channel which they might highly appreciate.

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Perception de la maladie par les détenteurs de volaille en Suisse et leur accessibilité aux informations relatives à l'influenza aviaire hautement pathogène

La surveillance passive de l'influenza aviaire hautement pathogène (IAHP) chez la volaille consiste principalement en la notification des cas suspects par les détenteurs de volaille auprès des autorités vétérinaires. Du fait que peu est connu sur la perception de l'IAHP par les détenteurs de volaille en Suisse, une étude transversale a été conduite parmi les détenteurs de volaille en Suisse en 2007. Pour une triangulation des données et afin de récolter des informations complémentaires, des interviews ont été conduites avec des experts d'organisations de commercialisation de volaille. Les médias se sont avérés être la source et voie principale d'information consultée par les détenteurs de volaille. Le fait d'avoir une exploitation non commerciale de volaille était significativement associé avec un score de connaissance inférieur. Les détenteurs de volaille à but non commercial se sentaient négligés par les autorités vétérinaires. En ce qui concerne la perception des risques, les estimations des participants correspondaient généralement aux risques d'introduction de l'IAHP officiellement communiqués. En considérant les besoins et les connaissances des détenteurs de volaille en Suisse, nous recommandons de renforcer l'échange d'information entre les aviculteurs et les autorités vétérinaires cantonales et nationales. Le défi principal consistant en l'intégration continue des détenteurs de volaille non commerciale dans la voie d'information.

Percezione da parte degli allevatori di pollame in Svizzera della malattia e accesso all'informazione concernente l'influenza aviaria altamente patogena

La sorveglianza passiva dell'influenza aviaria altamente patogena (IAAP) nel pollame consiste principalmente nella notifica alle autorità veterinarie dei casi sospetti segnalati dagli allevatori di pollame. Attualmente poco è noto circa la percezione dell'IAAP dei detentori di pollame in Svizzera, uno studio trasversale é stato condotto tra gli allevatori di pollame in Svizzera in 2007. Ulteriori interviste con degli esperti di organizzazioni per il commercio del pollame sono state effettuate per avere una triangolazione dei dati e per ottenere informazioni complementari. I mass media si sono avverati essere le fonti e le vie principali di informazione consultate dagli allevatori di pollame. Il fatto di gestire un piccolo allevamento di pollame era significativamente associato ad un livello inferiore di conoscenze. I piccoli allevatori interrogati si sentivano trascurati dalle autorità federali. In generale, i rischi percepiti dagli allevatori riflettevano bene i rischi ufficialmente comunicati riguardanti l'introduzione dell'IAAP. Considerando i bisogni degli allevatori in Svizzera, le loro preoccupazioni e le loro conoscenze, raccomandiamo di rafforzare lo scambio di informazioni tra gli allevatori e i servizi veterinari cantonali e federali. La sfida principale consisterà nell'integrazione costante degli allevatori amatoriali nei canali di informazione ufficiali.

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