Food and Agriculture Organization of the United Nations

# GLOBAL ANIMAL DISEASE INTELLIGENCE REPORT

CONTENTS




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JANUARY – MARCH 2015

# Summary

## Animal disease situation

From January to April 2015, disease reports from countries in North and West Africa, the Middle East, East, South and Southeast Asia mainly included Foot-and-Mouth disease (FMD) and H5N1 highly pathogenic avian influenza (HPAI) outbreaks, two major transboundary animal diseases of economic concern globally. This period was characterized by continued global spread of various Avian Influenza (AI) subtypes, regional spread of H5N1 HPAI in West Africa and continued regional spread of Lumpy Skin Disease (LSD) in the Middle East. Continuation of the ongoing regional epidemics of Ebola in West Africa and Middle East respiratory syndrome coronavirus (MERS-CoV) in the Middle East was also observed.

## Drivers of disease emergence and spread

Slight changes in global meat prices were observed during this period with decreased prices for bovine and ovine meat, and increased prices for pork. Poultry prices did not change. These changes in meat prices may have caused people to move their animals to those areas where prices were lower. Pathogens may have spread as a result of these movements. The reduction in bovine and ovine prices was due to the falling exchange rates of most local currencies relative to the US dollar and oversupply, while the announcement of the opening of European Union-funded aid to private storage for pork resulted in increased prices of those meat products. Countries in Asia celebrated Chinese New Year in February, which usually increases the demand for animal products resulting in more live animal trade and movement. Increased livestock trade and animal movements during festive periods are normally associated with the increased possibility of disease spread (e.g. H5N1 HPAI) in countries such as Viet Nam and China.

## Risk assessment

The overall estimated risk probabilities and associated levels of uncertainty for risk of introduction and spread of H5N1 HPAI for each of five countries in West Africa are presented in Table 1. The overall risk of H5N1 HPAI introduction from Nigeria into the five West African countries via the various risk pathways ranged from low to high, with moderate to high levels of uncertainty. The risk of H5N1 HPAI spread within each of the five countries once it has entered was estimated as medium to high with varying levels of uncertainty. The introduction of H5N1 HPAI would have important consequences for the commercial sector as well as for food security in each country (results not shown).

## Forecasting of potential threats

Table 2 summarizes the forecasts for April to June 2015 globally based on rapid qualitative risk assessment. The overall infection pressure in the various regions during the upcoming three-month period is considered moderate to high for the following reasons:

- decreased risk of H5N1 HPAI outbreaks is expected throughout South and Southeast Asia during the next three months, as historically the number of H5N1 HPAI outbreaks decreases during April through June;
- increased risk of LSD spread within the areas in the Middle East, to areas in the Caucasus, Central Asia and Southeast Europe;
- increased risk of spread of FMD serotype O from Algeria to the neighbouring countries of Libya, Morocco and Tunisia, all of which have a history of animal trade with Algeria and have experienced political unrest that has had an impact on veterinary services;
- decreased reports of human cases of MERS-CoV in the Middle East region given the observed seasonality patterns with peaks generally observed during March through April;
- continued human cases of Ebola virus disease in affected countries in West Africa.

SECTION 1

# Overview of the animal disease situation

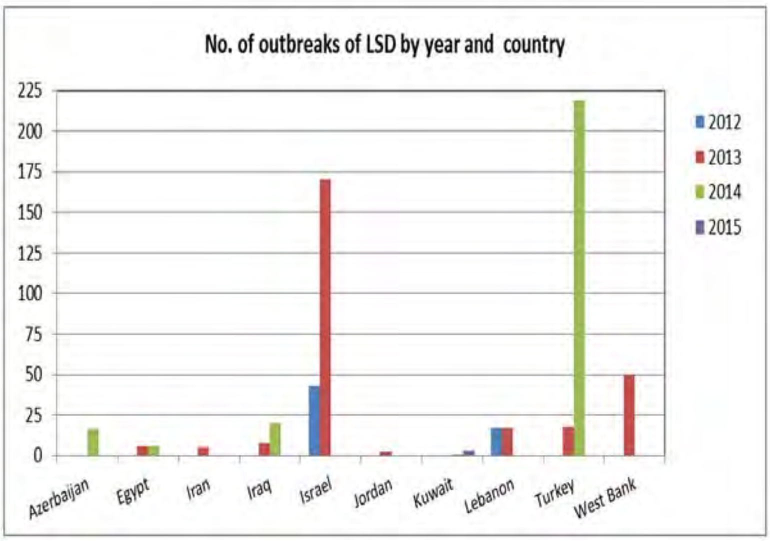
## Livestock disease events

### Lumpy Skin Disease (LSD)

Between January and February 2015, **Kuwait** reported outbreaks of LSD (November 2014) in dairy cattle in Sulaibiyah, Al Jahrah Governorate. Prior to these reports, LSD outbreaks were last detected in 1991. These current outbreaks in Kuwait are part of the ongoing spread of LSD across the **Middle East** region since the virus was first detected outside of **Africa** in **Israel** in 1989. Up until January 2012, LSD spread to **Bahrain**, **Kuwait**, **Oman**, **Yemen** and **The West Bank**. Since then, LSD has been officially reported in **Palestinian Autonomous Territories** (April 2013), **Jordan** (May 2013), **Israel** (August 2013), **Iraq** (March 2014), **Egypt** (May 2014), **Turkey** (May 2014), **Azerbaijan** (October 2014), **Lebanon** (October 2014) and **the Islamic Republic of Iran** (November 2014).

Possible routes for the introduction of LSD virus into Kuwait in November may have been mediated by wind-carrying vectors such as stable flies *(Stomoxys calcitrans)* from neighbouring infected countries or the importation of live animals. The disease could also have been introduced via infected/contaminated flies entering Kuwait on board ships with animal consignments from the Horn of Africa; however, this represents a relatively low risk because of the short survival time of LSD virus in insects. These possible routes of LSD introduction into Kuwait need to be further investigated in light of disease occurrence in neighbouring countries, particularly Iraq and the Islamic Republic of Iran.

**Figure 1.** LSD outbreaks reported in Middle East (2013–2015)

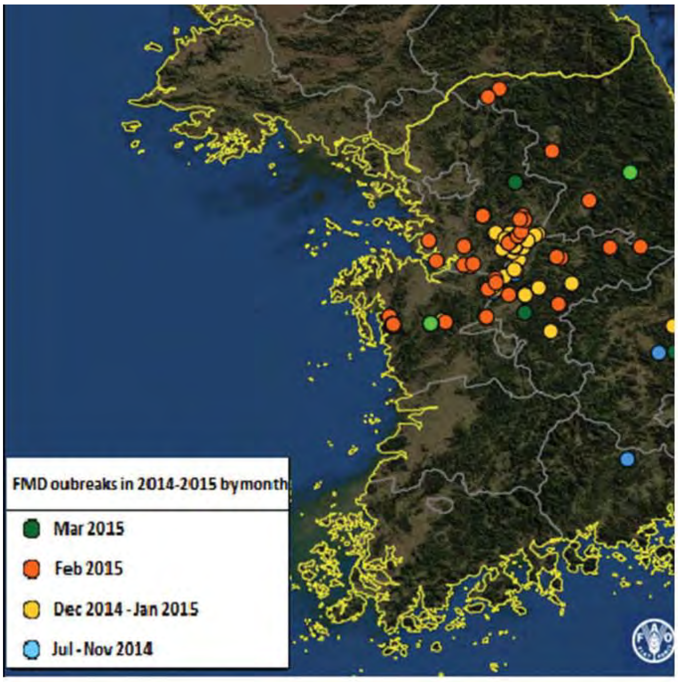

### Foot-and-Mouth Disease (FMD)

In **Asia**, the **Republic of Korea** continued to report FMD outbreaks, after initial confirmation in July 2014. Between January and March 2015, 157 outbreaks of serotype O were reported in different cities/counties, primarily in pig farms (153 in swine and 4 in cattle). The current outbreaks are different from the previous outbreaks of 2010 and 2011, which affected multiple species including cattle (97), pigs (55) and goats (1). The current outbreaks have since spread to seven (41 percent) out of 17 provinces of the country (see Figure 2a).

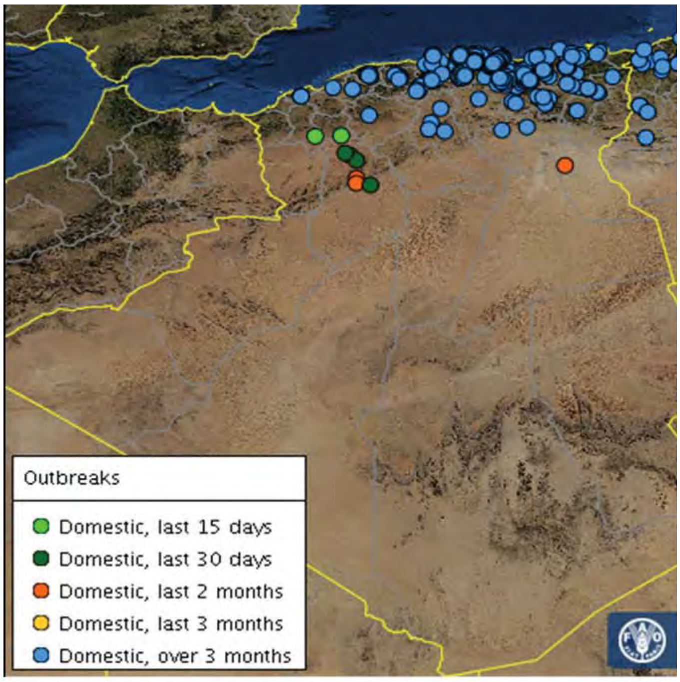
In **Africa**, **Algeria** continued reporting FMD serotype O outbreaks. A total of 429 outbreaks have been detected, affecting 30 (63 percent) provinces out of 48, mostly in the northern part of the country since July 2014 (see Figure 2b). Nine new outbreaks were recorded in livestock (cattle, sheep and goats) between January and March 2015. FMD outbreaks were also recorded in Tunisia until October 2014.

**Figure 2.** Map of FMD outbreaks in: (a) the Republic of Korea and (b) Algeria and Tunisia. Outbreaks are colored according to onset dates

a)




b)




# Zoonotic disease events

## Avian Influenza (AI) – H5N1 HPAI

H5N1 HPAI has spread to **Africa** (Burkina Faso, Libya and Nigeria), the **Middle East** (Israel and The West Bank) and **Eastern Europe** (Bulgaria and Romania), while outbreaks continued in countries in Asia where the disease is endemic.

**Burkina Faso** officially confirmed the incursion of H5N1 HPAI in poultry (for the first time since 2006) in February 2015 and additional outbreaks during March 2015. Thus far, four outbreaks have occurred in two provinces (Kadiogo and Sanguie) affecting poultry (chickens, Guinea fowls, ducks and turkeys) with 100 percent mortality within affected farms/premises.

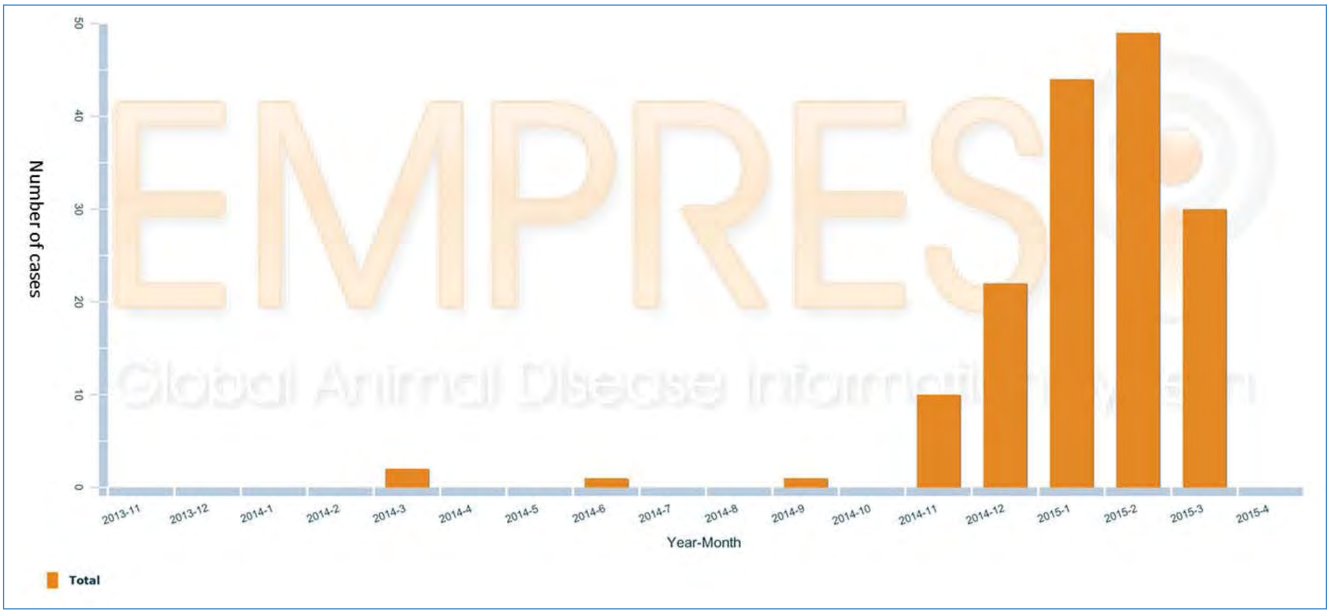
**Nigeria** officially confirmed the incursion of H5N1 HPAI in poultry (for the first time since 2008) in early January. Thus far, outbreaks have occurred in 18 out of 33 provinces across Nigeria affecting primarily medium-sized farms (5 000 - 10 000 birds). Nearly 1 400 000 birds have been depopulated (death + culling) in 425 farms (including 10 live bird markets) and 1 zoological garden.

**Libya** reported one outbreak of H5N1 HPAI during February.

Since December 2014, **Egypt** has reported an increased number of outbreaks/detections of H5N1 HPAI virus in poultry compared to previous months and to the same period in previous years. Between 1 December 2014 and 31 March 2015, 443 outbreaks in poultry were observed in Egypt, while between 1 December 2013 and 31 March 2014 there were only 60. The outbreaks were detected through both passive and active surveillance efforts and the Community Animal Health Outreach system in place since 2006.

Additionally, a significant increase in H5N1 human cases was observed in **Egypt**. As of 31 March 2015, 336 confirmed human cases have been reported in Egypt since 2006 114 were fatal and at least 290 cases had contacts with domestic poultry. From 1 November 2014 to 31 March 2015 (see Figure 3), 155 cases were confirmed (representing 46.1 percent of the total confirmed cases) with 32 deaths. Compared to similar periods during previous years, the number of human cases observed represents a four-fold increase in case numbers.

**Figure 3.** Number of human infections with H5N1 in Egypt from 1 November 2013 to 31 March 2015




Between December 2014 and March 2015, several dead wild birds were found near the Black Sea in **Bulgaria** (Burgas and Silistra region) and in **Romania** (Constanta region); additionally, one commercial poultry farm was reported infected in Burgas region in Bulgaria.

New incursions of H5N1 HPAI outbreaks were reported in the **Middle East**, affecting **Israel** and **The West Bank** and **Gaza Strip**. Previous outbreaks occurred in Israel and The West Bank, three and four years ago, respectively.

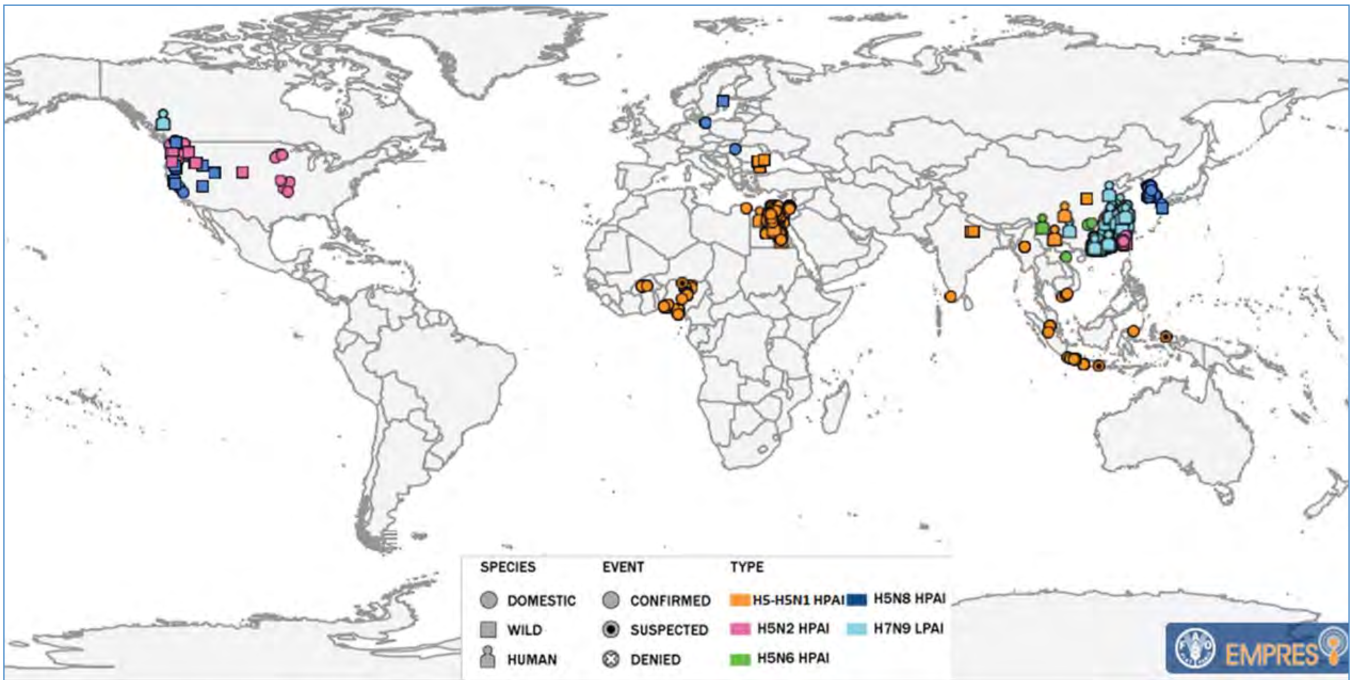
Genetic sequencing revealed that the isolates from the Israeli outbreaks are almost identical (99 percent similarity) to the Egyptian poultry viruses isolated in 2013 and 2014.

In **Asia**, five countries reported H5N1 HPAI outbreaks during the period; **India** reported new poultry outbreaks in Kerala State, a continuation of those that began in the southern part of the country in November 2014. **China** continued to report H5N1 HPAI in poultry in Jiangxi and Xizang provinces. Positive findings in wild birds and captive tigers were detected in Henan and Guangxi provinces, respectively.

## Other Avian Influenzas (AI)

A diversity of non-H5N1 influenza virus subtypes associated with disease outbreaks in poultry and wild birds were reported in **Asia**, **Europe** and the **Americas** during the reporting period (see Figure 4).

**Figure 4.** Map of relevant AI events in animals and humans reported globally (January–March 2015)



In **Asia**, H5N3, H5N2, H5N6 and H5N8 HPAI in poultry were reported in **China** (mainland and in Taiwan, Province of China), while **Japan** and the **Republic of Korea** reported H5N8 HPAI and Viet Nam reported H5N6 HPAI. **China** continues to report human cases of infection with H5N1 HPAI (4 new cases, 1 death) and H7N9 LPAI (167 new cases, with almost 7 deaths). Two imported cases (ex-China) were detected for the first time in Canada in January 2015. Two people returning to British Colombia from travel to China presented mild symptoms of H7N9 infection.

In **Europe, Germany, Hungary and Sweden** have reported HPAI H5N8 in poultry and wild birds in the period covered in this report. Since November 2014, five outbreaks of H5N8 HPAI were reported in poultry in Germany (northern part of the country) and one in Hungary. HPAI H5N8 infection was also reported in wild birds (swans), including captive birds (white storks), and in Germany and Sweden.

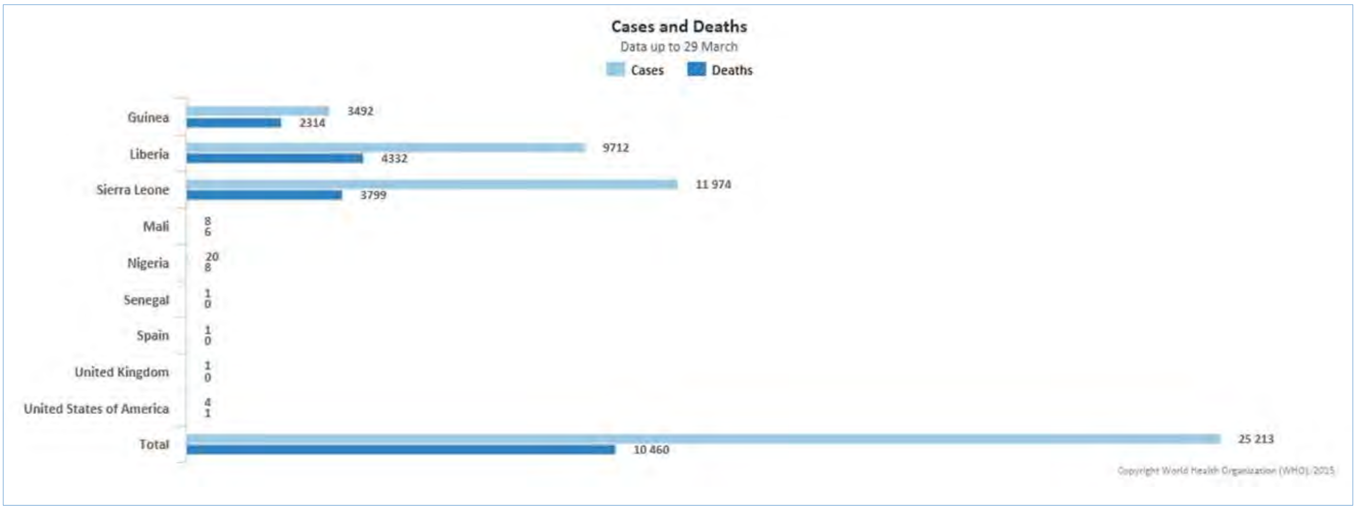
In **America**, the **United States of America**, from January 2015, has reported cases of H5N2 (33) and H5N8 HPAI (15) in wild and domestic birds in several states: Arkansas, California, Idaho, Kansas, Minnesota, Missouri, Montana, Nevada, Oregon, South Dakota, Utah, Washington and Wyoming.

In **Africa**, in **Egypt**, on 10 February 2015, the Ministry of Health and Population of Egypt reported a human case of AI H9N2 detected by the routine national surveillance system in Aswan Governorate. H9N2 virus has been detected in the Egyptian poultry sector since 2011, but the case mentioned above is the first human case in the country. The case had a history of contact with backyard poultry which were apparently healthy. H9N2 was detected in poultry in Egypt for the first time in 2011. From December 2014 to January 2015, 24 H9N2 isolates obtained from 23 chickens and 1 quail (20 from farms and 4 from markets) were sequenced. Phylogenetic analysis of the HA gene showed that the isolates fall into one group with Egyptian H9N2 viruses isolated between 2011 and 2014. However, some of them form a new subcluster.

## Ebola

In **West Africa**, Ebola virus continued to spread within the three most affected countries (**Guinea**, **Liberia** and **Sierra Leone**) where 4 466 confirmed cases and 2 225 deaths were registered during this reporting period, showing a decrease in virus transmission (mainly in Liberia). Incidence in Guinea has continually fluctuated while in Liberia and Sierra Leone the reductions have been more consistent. The World Health Organization (WHO) declared Mali free from the disease on 18 January 2015. The overall number of cases (including confirmed, suspected and probable cases) and deaths at 31 March 2015 was: 25 213 and 10 460, respectively. In the three most affected countries, the reported number of cases is 25 178 with 10 445 deaths. The total number of confirmed and probable cases is similar in males and females. Compared with children (people aged 0 to 14 years) and adults aged 45 and over, people aged 15 to 44 were approximately three times more likely to be affected. See Figure 5.

**Figure 5.** Confirmed, probable and suspected EVD cases worldwide




*Source*: WHO, 2015

## MERS-CoV

**Oman**, **Qatar** and **Saudi Arabia** continued to report human cases of MERS-CoV in the Middle East during the reporting period. **Oman** reported an additional case that had contact with a previously confirmed case, and **Qatar** reported two new cases. **Saudi Arabia** reported 143 new infections, increasing its case total to 973 and 422 deaths. Since April 2012, 5 cases and 3

deaths were reported in Oman, while 12 cases and 5 deaths were detected in Qatar. Two additional imported cases were reported in **Germany** and the **Philippines**, involving patients who felt ill after returning from travel to the Middle East countries.

Between April 2012 and March 2015, 1 105 human infections with MERS-CoV and 456 associated deaths were reported globally, mainly in the Middle East. Camels are thought to be the source of virus to humans, but no studies have conclusively substantiated this hypothesis. Results from a recently published article (April 2015, *Emerging Infectious Diseases Journal*), suggested that transmission of MERS-CoV virus from dromedaries to humans is rare. Serum samples taken from 191 persons in Saudi Arabia (with varying levels of exposure to an infected local dromedary camel herd) tested negative for antibodies to MERS-CoV.

## Update on the severe fever with thrombocytopenia syndrome (SFTS) situation in Asia

**Eastern Asia**: In February 2015, the Ministry of Health and Welfare reported possible human-to-human transmission of severe fever with thrombocytopenia syndrome (STFS) among medical personnel in the **Republic of Korea**. Prior to this event, China reported human-to-human transmission (due to blood and direct contact among humans). SFTS virus belongs to *Bunyaviridae*, *Phlebovirus*. This virus is transmitted by ticks (*Haemaphysalis longicornis*) which are distributed across a number of countries in Asia (China, Japan and the Republic of Korea), Australia and New Zealand. Before 2009, SFTS was an unknown disease involving severe fever and thrombocytopenia in China. In 2011, after two years of investigation, the disease was identified as SFTS. Between 2011 and 2012, SFTS virus infection was confirmed in 2 047 humans in China, and in 2013 the virus spread to Japan and the Republic of Korea. Clinical signs in humans include fever, vomiting, diarrhoea and anorexia. Over 95 percent of patients show thrombocytopenia, and most show lymphopenia, lymph node enlargement and haemorrhage. A number of species such as cattle, goat, sheep, pig, dog and poultry (chicken) are considered as an intermediate reservoir of the virus. There is currently no specific antiviral agent or vaccine, and patients are treated using symptomatic therapy.

SECTION 2

# Disease drivers

Well-known factors/drivers that influence the dynamics of animal and zoonotic diseases globally include changes in agro-ecology, human behaviours and movements (including animals), intensification in interfaces with wildlife species, and climate change, among others. This section describes briefly the observed changes in major drivers that could have influenced the pattern of disease observed during this reporting period. Given the complex nature of the interaction between drivers and disease occurrence, this section does not attempt to provide proof of association or causation, but tries to highlight some key disease risk factors globally.

**Agro-ecological drivers:** The observed changes in **climatic conditions globally** related to **rainfall** and **temperature** observed during the reporting period are presented in Figure 6 and described **here**. Conditions related to rainfall and temperature are known to affect pathogen survival in the environment and disease vector behaviour. High temperatures and heavy seasonal rainfall as well as the presence of water (i.e. flooding, rivers etc.) are generally associated with an increase in blood-feeding arthropods which may increase the likelihood of transmission and occurrence of vector-borne diseases such as LSD, Rift Valley fever and tripanosomiasis in areas where these diseases are endemic. The persistence and stability of AI viruses are increased as the result of low temperatures and high relative humidity. Additionally, wild bird migration patterns and their ability to spread diseases like H5N1 may be impacted by climatic changes and by alterations in migratory pathways.

The occurrence of heavy rains since January resulted in extensive flooding in Madagascar, Malawi and Mozambique while abnormal dryness persisted in many regions of **southern Africa, central** and **northern Ethiopia** and **northern areas of the United Republic of Tanzania.** Overall, dryness was observed in **West Africa** during April, except for coastal areas. The observed El Niño Southern Oscillation (ENSO) conditions were weak but positive, implying low-risk conditions for the occurrence of Rift Valley fever or other vector-borne diseases in **Africa** during the reporting period.

The first quarter of 2015 was the warmest period on record across the world's land and ocean surfaces, at 0.82°C (1.48°F) above the twentieth century average, surpassing the previous record of 2002 by 0.05°C (0.09°F). The average global land surface temperature was also a record high for the January–March period, at 1.59°C (2.86°F). Most of **Europe** (including Scandinavia), **Asia**, **South America**, **eastern Africa** and **western North America** were much warmer than average particularly in the western United States, northwestern Russia, parts of south central China and an area of northeastern Australia. **Central India**, southeastern Mauritania, central Mexico and eastern Canada were cooler than average. Part of northeastern Canada was much cooler than average. Further details can be found here.

Abnormally high temperatures during January 2015 as well as low rainfall levels were predominant in **Central Asia**. In the **Middle East**, including Kuwait and surrounding areas, the conditions were similar. The observed conditions of low rainfall and high temperatures in the Middle East did not provide adequate conditions for the observed incursion and spread of LSD in Kuwait given the importance of high temperatures and high rainfall in the epidemiology of the disease.

**Animal trade:** A number of countries in South and Southeast Asia (including China, Myanmar, the Republic of Korea and Viet Nam) celebrated Chinese New Year in February, a period when an increase in live animal trade and movement was expected as a result of the increased demand for animal products. Increased livestock trade and animal movements during festive periods are normally associated with the increased possibility of disease spread (e.g. H5N1 HPAI) in countries such as Viet Nam and China.

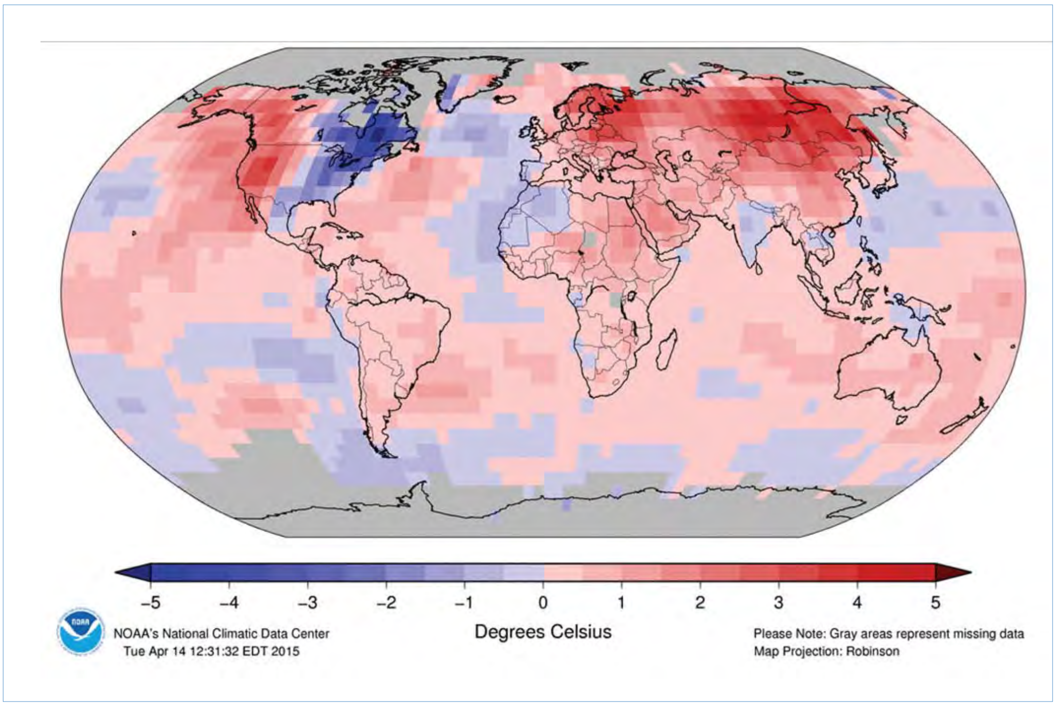
For this period, there were no reported changes in legal animal trade between countries globally. Trade between countries poses opportunities for animal diseases to spread globally. Generally, reliable data are not available on informal trade/movement of animals and animal products between countries (which is underestimated), but it is assumed that incentives for informal trade may increase during periods of increased demand (i.e. festivities), and when there are price differences across borders, among other factors.

The changes in the **global meat prices** were variable; price indices for bovine and ovine meat decreased, while those of poultry remained unchanged and swine meat prices increased to normal. The reduction in bovine and ovine prices were due to falling exchange rates against the US dollar and an oversupply, while the announcement of the opening of EU-funded aid to private storage resulted in increased prices of pork. Price differentials across regions and borders increase incentive for unregulated animal and animal product-related movements and, therefore, any pathogens or diseases.

**Civil unrest:** A number of events related to natural disasters and social unrest were observed, which could have resulted in changes in animal health conditions in countries across the globe (see Figure 7). Terrorism and political instability were observed in several countries in **North Africa** (Egypt, Libya and Tunisia), **Central and West Africa** (the Central African Republic, Mali and Nigeria) and **West Central Asia** (Afghanistan, Lebanon, the Syrian Arab

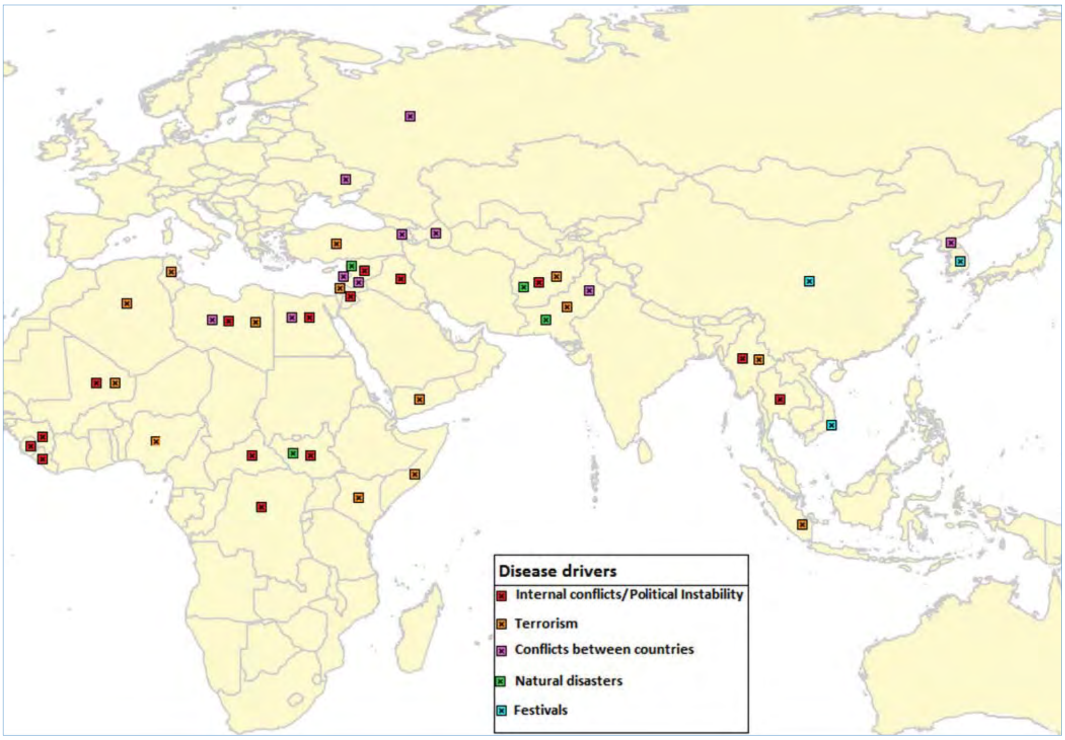
Republic and The West Bank). These situations generally result in interruptions in basic veterinary services and activities leading to higher risk of diseases going unnoticed and uncontrolled spread. Related population movements also occur, with some of these movements involving animals and animal products, changing geographic locations of demands for animals and animal products and, therefore, trade and price differentials. Countries with higher levels of activities (i.e. those reporting more than two events) include , Afghanistan, Egypt, Israel, Libya, Mali, Myanmar, Pakistan, South Sudan, Syria and The West Bank. In countries like Nigeria, where terrorism is present in particular areas, and Libya, where functional government is absent, reports of H5N1 HPAI have occurred.

**Figure 6**. Global temperature anomalies - January to April 2015




*Source*: **NOAA**

**Figure 7.** Map of selected disease drivers reported globally during January to March 2015



SECTION 3

# Risk assessment activities

## Risk of H5N1 HPAI spread in West Africa

The confirmation of a new incursion of H5N1 HPAI into Nigeria in January 2015 meant that neighbouring countries in West Africa are at risk of introduction through multiple risk pathways including informal trade and wild bird migration. The various risk assessment activities conducted by FAO to inform mitigation efforts are summarized subsequently.

A rapid risk assessment following the World Organisation for Animal Health (OIE) framework (2004) for introduction, spread and consequence assessment, was undertaken for the five countries immediately neighbouring Nigeria. Focal points within each country responded to an online questionnaire with the following risk questions: (a) What is the risk of H5N1 HPAI spreading from Nigeria to each of the five countries via cross-border trade (legal versus illegal) and movements involving live birds, poultry products, feed, people, fomites and wild birds? (b) What is the risk of H5N1 HPAI spreading within each country once introduced via trade in live birds and products, and the movement of equipment and people and wild birds? (c) What would be the consequences of H5N1 HPAI introduction and spread in each of the five countries? The various risk categories[1] used went from negligible to high while the level of uncertainty[2] went from low to high. A summary of the overall estimated risk probabilities and associated levels of uncertainty for risk of introduction and spread for each country is presented in Table 1. The overall risk of H5N1 HPAI introduction into the five West African countries via the various risk pathways ranged from low to high, with moderate to high levels of uncertainty. The risk of H5N1 HPAI spread within each of the five countries once it has entered was estimated as medium to high with varying levels of uncertainty. The introduction of H5N1 HPAI would have important consequences for the commercial sector as well as for food security in each country (results not shown).

In addition to the rapid risk assessment, a global-level analysis of H5N1 HPAI risk factors was undertaken to identify and map areas with similar agro-ecological profiles in relation to HPAI risk of spread and persistence. Factors considered for the global-level analyses included backyard and commercial chicken densities, duck density, human population density, gross domestic product (GDP) per capita and proximity to wetlands (as a proxy for water bird risk areas). The method used was a niche modelling approach (Hogerwerf *et al.,* 2010) by FAO.

Based on the risk maps generated from the global-level analyses, Nigeria was mainly characterized by niches #8 (yellow) and #10 (red), covering 74 percent and 19 percent of its land area, respectively (Figure 8), while the other West African countries were mainly characterized by niche #8. High densities of backyard chickens and human population characterize the yellow niche, while high densities of commercial chickens and ducks characterize the red niche. Moderate distances to wetlands (about 30 km) also characterized both niches. The highest number of H5N1 outbreaks in Nigeria during 2015 was observed within niche #8. The agro-ecological patterns in Nigeria are similar to those observed in Southeast Asian countries, such as Cambodia, Indonesia and Viet Nam where H5N1 HPAI routinely occurs. Ghana is the only country in West Africa showing an agro-ecological pattern relatively similar to that observed in Nigeria, implying similar H5N1 HPAI risk. These results highlight similar H5N1 HPAI risk for Nigeria and countries in Southeast Asia based on similarities in the agro-ecological patterns observed in these countries. Given the wide distribution of the yellow niche in western Africa, the risk of disease spread in the region is considered to be relatively high.

[1] **Negligible** – event is so rare that it does not merit to be considered; **Low** – event is rare but does occur; **Medium** – event occurs regularly; **High** – event occurs often.

[2] **Low** – There are solid and complete data available; strong evidence is provided in multiple references; author reports similar conclusions; **Medium** – There are some but no complete data available; evidence is provided in small number of references; authors report conclusions that vary from one another; **High** – There are scarce or no data available; evidence is not provided in references, but rather in unpublished reports or is based on observations or personal communication; authors report conclusions that vary considerably between them.

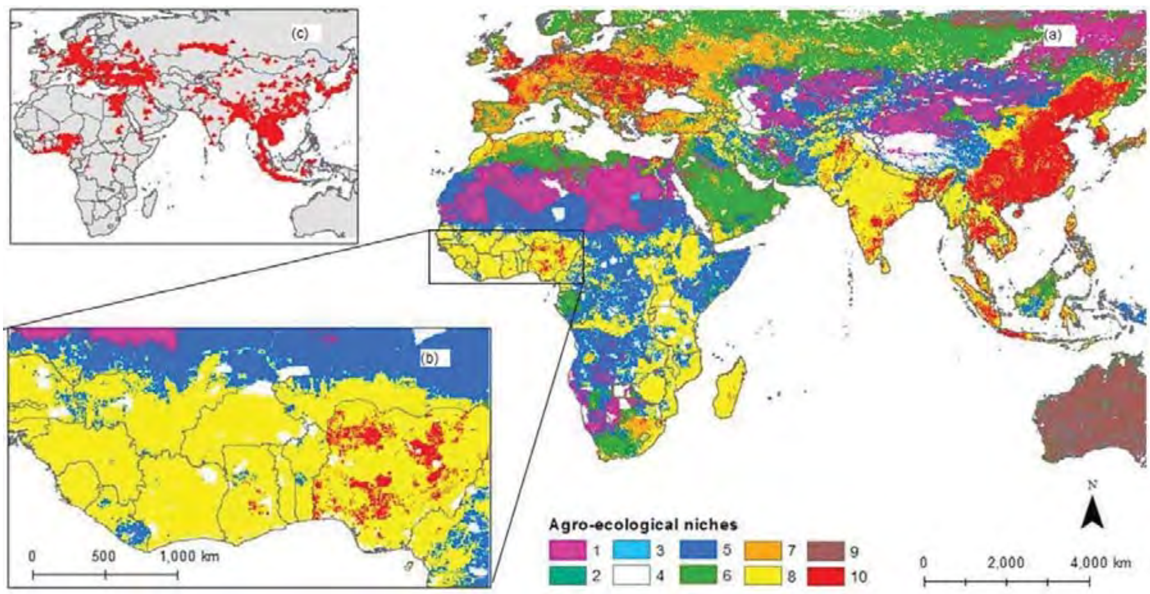
**Table 1.** Results of the rapid risk assessment for H5N1 HPAI spread within West Africa. Overall estimate of risk of introduction of H5N1 HPAI into the five West African countries from Nigeria via cross-border trade (legal and illegal) and movement of domestic poultry, wild birds and people, and risk of spread of H5N1 HPAI within each country, once introduced.

| RISK PATHWAY | PROBABILITY [3] | UNCERTAINTY [4] | COMMENTS |
|---|---|---|---|
| **Introduction assessment** | | | |
| Risk of H5N1 HPAI introduction to Benin | Medium | High | Illegal trade the most likely route based on previous outbreak experience in 2006. |
| Risk of H5N1 HPAI introduction to Cameroon | Medium | Moderate | Presence of open borders.<br>No respect for biosecurity. |
| Risk of H5N1 HPAI introduction to Niger | Low | Moderate | Existence of commercial trade with Nigeria. |
| Risk of H5N1 HPAI introduction to Chad | High | High | Lack of surveillance, bioterrorism due to Boko Haram, the arrival of refugees from infected areas, open/porous borders. |
| Risk of H5N1 HPAI introduction to Togo | Medium | Moderate | Type of production system, presence of trade links with Nigeria, primary and secondary collectors, weak disease recognition and surveillance system for avian diseases, shared and open borders with Nigeria. |
| **Spread assessment** | | | |
| Risk of HPAI spread within Benin | High | High | Based on experience with outbreaks in 2006. |
| Risk of H5N1 HPAI spread to Cameroon | Medium | High | Presence of different production systems. |
| Risk of H5N1 HPAI spread to Niger | Medium | Moderate | Presence of different poultry production systems with differing biosecurity levels. |
| Risk of H5N1 HPAI spread to Chad | High | High | Lack of surveillance. |
| Risk of H5N1 HPAI spread to Togo | Medium | Moderate | Prevalent type of production system in the country. |

[3] **Negligible** – event is so rare that it does not merit to be considered; **Low** – event is rare but does occur;
**Medium** – event occurs regularly; **High** – event occurs often; [3] **Low** – There are solid and complete data available; strong evidence is provided in multiple references; authors report similar conclusions; **Medium** - There are some but no complete data available; evidence is provided in small number of references; authors report conclusions that vary from one another; **High** – There are scarce or no data available; evidence is not provided in references, but rather in unpublished reports or based on observations or personal communication; authors report conclusions that vary considerably between them.

[4] **Low** –There are solid and complete data available; strong evidence is provided in multiple references; authors report similar conclusions; **Moderate** –There are some but no complete data available; evidence is provided in a small number of references; authors report conclusions that vary from one another; **High** –There are scarce or no data available; evidence is not provided in references, but rather in unpublished reports or based on observations, or personal communication; authors report conclusions that vary considerably between them.

**Figure 8.** (a) A ten-cluster H5N1 HPAI niche map obtained using k-mean clustering. (b) The agro-ecological niches in western Africa. (c) H5N1 outbreaks between 2004 and 2015. The red and yellow niches included regions with the largest number of H5N1 outbreaks



SECTION 4

# Disease forecasting

Table 2 provides a summary of the expected disease situation globally for the next three months (from April to June 2015).

Figures are based on observed trends in disease and disease drivers such as civil unrest, climatic conditions and the opinions of FAO experts across the globe.

**Table 2.** Summary of forecasts for April to June 2015 (three-month period)

| DISEASES | THREAT FORECAST | GEOGRAPHIC AREAS | LEVEL[5] | NOTES |
|---|---|---|---|---|
| **Avian Influenza(AI)** | | | | |
| | Further spread of H5N1 HPAI | Middle East (Israel, West Bank, Gaza strip) | Low to medium | Limited capacity to implement adequate control measures in West Bank area; historically low reporting period for H5N1 HPAI. |
| | Spread of H5N1 from Egypt to neighbouring countries | North Africa (Libya) | Medium | Civil unrest, terrorism and political instability in the region may exacerbate the possibility of disease spread due to inadequate control measures such as movement control, quarantine and vaccination. |
| | Further spread of subtypes: (H5N1, H7N9, H5N2, H5N3, H5N6, H5N8) in poultry | Southeast Asia | Low to medium | Seasonally low period for AI activity. |
| | Risk of human exposure to AI viruses from poultry | Southeast Asia | Low | Seasonally low period for AI activity. |
| | Spread of H5N1 HPAI from currently affected countries in West Africa | West Africa | Very high | Continuation of civil unrest and possible increase of illegal movement of poultry. |
| | Spread of AI (H5N1, H5N2, H5N8) in poultry | North America | | |
| **Sheep and Goat pox** | | | | |
| | Further spread from Mongolia to neighbouring countries including Kazakhstan | Eastern Asia | Medium to high | Existence of cross-border trade of small ruminants with China particularly when price differentials are favourable. |
| **FMD serotype O** | | | | |
| | Further spread of FMD (serotype O) within affected countries (Mongolia and Republic of Korea) | Eastern Asia | Medium | Possible spread to other areas due to uncontrolled animal movement. |
| | Spread of FMD from Algeria to neighbouring countries | Northern Africa: (Libya, Morocco and Tunisia) | | Civil unrest, terrorism and political instability in the region may exacerbate the possibility of disease spread due to inadequate control measures such as movement control, quarantine and vaccination. |

[5] **Low** = An event is unlikely; **Medium** = An event is possible but not likely; **High** = An event is a strong possibility; **Very high** = An event is highly likely; **Extremely high** = An event is imminent.

*(cont.)*

*(cont.)*

| DISEASES | THREAT FORECAST | GEOGRAPHIC AREAS | LEVEL | NOTES |
|---|---|---|---|---|
| **Lumpy skin disease (LSD)** | | | | |
| | Continued regional spread and increased threat to livelihoods and food security | Middle East, The Caucuses, Central Asia and Southeast Europe | Medium to high | Given the importance of insect vectors in the disease transmission dynamics, forecasted climatic conditions during the next three months in the region are favourable. |
| **Rift Valley fever** | | | | |
| | Possible occurrence of outbreaks | East Africa: Kenya, Somalia, Uganda, United Republic of Tanzania and South Sudan | Low to medium | Seventy percent chance that El Niño conditions will continue through the Northern Hemisphere in summer 2015, and a greater than 60 percent chance that it will last through autumn; above normal rains may occur in East Africa during the latter half of the year. Countries should remain vigilant. |
| **Porcine epidemic diarrhoea virus (PEDV)** | | | | |
| | Further spread from affected countries | Central America | Medium | |
| **Bovine Paralytic Rabies** | | | | |
| | Further spread | Central America | Medium | |
| **MERS CoV** | | | | |
| | Continued occurrence of human cases in Saudi Arabia | Middle East (Saudi Arabia) | Low to Medium | Evidence points to seasonal patterns in reporting/occurrence with peaks during March–April period with cases expected to decrease after April. |
| | Possible spread to neighbouring countries | Middle East, North Africa | High | Illegal movement of camels, considered to be an important spread pathway, is probable in the region; uncertainties related to transmission dynamics, particularly the role of camels. |
| **Ebola** | | | | |
| | Spread of Ebola in humans from currently affected countries | West Africa | Medium to high | Very low and poor health condition in the three most affected countries could lead to a further spread of disease which is not yet under control. |

Source: *EMPRES-i*; Quarterly *EMPRES-FCC*, January 2015 – March 2015.

SECTION 5

# New publications and articles

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# Sources of Information

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**EMPRES-i**
http://empres-i.fao.org/eipws3g/

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**FAO EMPRES Watch**
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