



# POULTRY PLUIMVEE BULLETIN

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**EYES HAVE IT FOR  
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Acting CEO: Dr Charlotte Nkuna - charlotte@sapoultry.co.za  
Advertising: Leandi Venter - advertising@sapoultry.co.za  
Design and Layout: Jelliweb - lisa@jelliweb.co.za  
Subscriptions: Cynthia Ncube - sapaadmin@sapoultry.co.za  
Letters to / Briewe aan: editor@sapoultry.co.za

Physical Address: Wild Fig Business Park, Block C,  
1494 Cranberry Street, Honeydew Ext 19  
Postal Address: P.O. Box 1202, Honeydew, 2040,  
South Africa  
Tel: 011 795 9920 | Fax: 011 795 2590



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# From the DESK



## SAPA's future, bird flu update and Galliova's back



**T**hese are defining times for the South Africa Poultry Association (SAPA), and the decisions made during these turbulent times will shape the poultry industry for foreseeable future. During times of crises, institutions emerge either well-bonded and stronger, or divided and completely destroyed. The hope is that the former will apply for the poultry industry and that SAPA will continue to

serve its members and industry for another 113 more years to come.

### Organisational Matters

#### Egg Producers

**A** special egg producers meeting was held on 14 September 2017. At this meeting, producers discussed the threats facing the industry such as regulations, diseases (Avian Influenza and Newcastle Disease) and producer apathy. The meeting resolved that it was indeed important for producers to stand together and united in order to tackle these emerging threats – and that a representative body was not a ‘nice to have’, but rather a ‘must have’. It was therefore agreed that the industry would seek a statutory levy to fund its activities. The egg organisation

has been carrying forward a deficit that keeps growing year on year. The statutory levy should therefore be enough to fund the egg organisation’s activities, as well as start to deplete the accumulated deficit.

An egg organisation committee meeting is planned where the organisation will decide on all the activities that it wishes SAPA to undertake on its behalf, as well as the structure required to carry out such activities and the budget needed to support them. A decision on the statutory levy collection point will also be made. Following this, SAPA will submit a statutory levy application to the National Agricultural Marketing Council (NAMC). The process of the levy application will take anything from six to eighteen months, depending on the objections and questions that the NAMC will receive from

the affected parties. It is worth noting that the poultry industry is the only animal protein industry that doesn't have a statutory levy in place, making the funding of critical activities very challenging.

### **Broiler Producers**

The key stakeholders in the chicken industry held a meeting on 22 September in Johannesburg. At this meeting, the South African Poultry Association (SAPA) announced its intention to set aside differences from within its ranks, and to work together to address the issues besetting the industry. The following major chicken producers – Astral, RCL Foods, Country Bird Holdings, Daybreak Farms, Chubby Chicks and Grain Field Chickens as well as the Egg Organisation – voted to adopt a united front going forward. This represents 70% of the local broiler producers and aims to get buy-in from the majority of the remaining 30%.

The next steps, similar to the Egg Organisation, is to look at the activities that the broiler industry wishes SAPA to undertake for them, the structure to support these activities, as well as the budget to pay for such activities. There is some way to go in ensuring that the industry is sustainable well into the future.

## **Avian Influenza update**

### **Latest highly pathogenic Avian Influenza outbreaks**

As per the update from DAFF, the number of

reported Highly Pathogenic Avian Influenza (H5N8) outbreaks is 68. The breakdown is as follows: twenty one outbreaks in commercial chickens (the commercial ducks have now been separated from commercial chicken statistics), twelve outbreaks in commercial ostrich, two outbreaks in commercial ducks, and eighteen outbreaks in wild birds – nine in birds that were kept as a hobby and six in backyard poultry. Quarantine and other related control measures have been instituted on all affected properties.

Farmers are encouraged to review their biosecurity measures and ensure their observation. If farmers require assistance, they should contact their veterinarian or a state veterinarian. Members of the public are also requested to report any sightings of higher than usual levels of chicken or wild bird mortalities to authorities.

Members are also reminded that this strain has been found not to be dangerous to humans and the birds affected are a very small percentage of the total South African chicken flock. At this stage there is significant impact on, particularly, egg supply. Contingency measures are being implemented to ensure continuity of supply of poultry products.

### **Outbreak forward and backward tracing**

The database and webpage are ready for use. We are just in the process of finalising access to the website for members.

### **Economic impact analysis of the outbreak**

The Bureau for Food and Agricultural Policy (BFAP) has been given the go-ahead for Phase One of the study, which will commence shortly. SAPA/PDMA will continue to engage collaborators on the study.

### **Vaccination**

The working group will have met DAFF by the time you read this to further discuss the way forward on the technical proposal. The Poultry Reference Laboratory has been requested to initiate an independent study into the appropriate vaccines. One vaccine will be evaluated in this calendar year; the other vaccine studies can only be scheduled in 2018.

### **Imports of hatching eggs**

Progress will be reported at the same meeting with DAFF on the preliminary evaluation of the effectiveness of measures in Brazil and the willingness of possible suppliers to enhance measures if required. Both the state and producers were requested to conduct parallel investigations.

### **Compensation**

DAFF has not finalised the compensation guideline. SAPA/PDMA recently engaged with the Industrial Development Corporation and the Landbank to assist with support and business continuity for affected farmers in areas where the Animal Diseases Act does not provide for compensation. The focus

is on job retention and creation as well as expansion of enterprises. Both entities have indicated their willingness to provide distress funding and indicated that affected companies may immediately approach the organisations for such assistance. However, specifically tailored packages will also be developed for supporting expansion and transformation projects.

Information regarding the Training Lay-Off Scheme has been received, and SAPA will forward the entire information package to all affected members. The Training Lay-Off Scheme will assist with training employees in affected farms on areas such as biosecurity, while those farms undergo the required cleaning and disinfection process and other measures related to AI controls prior to the start of the next cycle.

### **Registration of live chicken traders and submission of monthly reconciliation forms**

**S**ubmission of monthly reconciliations for September has begun. These submissions are lagging and members are requested to assist cull traders with the

process. Producers are once again reminded not to sell to traders that have not filed their monthly reconciliation forms. Role players are once again encouraged to comply with this control measure.

### **World Egg Day**

**G**lobal celebrations are in place for the 22nd year of World Egg Day on 13 October 2017. Established by the International Egg Commission in 1996, World Egg Day was created to promote the egg internationally. Now well recognised throughout the world, every year on the second Friday of October, countries all around the world celebrate the versatility and the health benefits of the egg, the small but mighty food source with the potential to feed the world.

Egg producers are encouraged to submit pictures of any events that will be happening to promote the consumption of eggs. The pictures will be posted on the SAPA website as well as other communication media such as the Eggcellence facebook page. →

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## Galliova Awards

**L**ocal food and health writers are embracing their heritage and forging their own sense of South African identity in their work. This is the word from the 2017 Galliova Award judges, who this week revealed the names of the finalists in this year's Local is Lekker-themed awards.

The quality of the editorials was once again exceptionally high, with the judges specifically commenting on the calibre of visuals and styling across the board. With a new broiler category having been introduced this year, the judges agreed they would like to see more unusual dishes showcasing chicken in future entries.

Long-serving Galliova Awards judge Dorah Sitole says the awards constantly raise the bar in food and health writing, as evident in this year's entries.

"Every year the awards get more competitive, and it was great to see so many new names entering this year. The quality of both the visuals and styling was superb, although there was room for more 'out the box' thinking as far as the recipes were concerned. We also hope to see stronger entries in the new broiler category next year," says Sitole.

Long-standing Galliova judge, Anna Montali, says it was very encouraging to see local writers stamping their own identity onto their work.

"The Local is Lekker theme came through very strongly, and it was great to see that writers are not simply following international trends anymore," she says.

Reflecting these comments, Zola Nene, resident chef on SABC 3's Espresso Morning Show and cookbook author, notes "the quality of styling was fantastic", while Marco Torsius, managing director of El-Azaar Poultry Farm in Bloemfontein and a member of the South African Poultry Association (SAPA) committee, agrees there was scope for "more interesting" chicken recipes.

Madeleine de Villiers (CPT), a nutritional consultant and registered dietitian in private practice, adds that while the majority of entries from health writers were of very high standard, she hopes more health writers will enter in future.

This year's awards include Galliova Food Writer of the Year (magazines) (R25 000), Galliova Food Writer of the Year (newspapers and weekly titles) (R25 000), Health Writer of the Year (R15 000), Up and coming Food or Health Writer of the Year (R15 000), Galliova Egg Champion (R20 000) and Galliova Broiler Champion (R20 000).

The Galliova Awards 2017 finalists (in alphabetical order) are:

- Food Writer Magazines - Abigail Donnelly, Herman Lensing and Margie Els-Burger.
- Food Writer Weeklies and Newspapers - Esther Malan and Suzanne Crozier.
- Up and Coming Food Writer - Claire Ferrandi, Liezl Vermeulen and Suzanne Crozier.
- Broiler Champion - Abigail Donnelly, Anna-Carolina Alberts and Margie Els-Burger.
- Egg Champion - Christa

Swanepoel, Hannah Lewry and Justine Kiggen

- Health Writer - Anna Rich, Glynis Horning and Salomé Delpont.

## IPC sustainability goals

**M**embers of the International Poultry Council (IPC) have adopted a unified strategy on sustainability goals and principles for the global poultry industry. Approved by IPC members from 17 countries at the organisation's recent conference in Banff, Alberta, the strategy lays out a long-sought roadmap for the poultry meat industry to follow to ensure its continued growth as the leading global provider of affordable protein.

The ground-breaking sustainability strategy is based on three pillars – economic, social and environmental, said Dr. Anne-Marie Neeteson of Aviagen, who chairs the IPC's Working Group on Environment and Sustainability.

The working group, comprised of a broad cross-section of IPC country members and associate members from around the world, worked for more than a year on developing the strategy. Discussion began in earnest at the IPC conference in Lisbon in late 2016.

Kind regards,  
Dr Charlotte Nkuna,  
Interim CEO. ■



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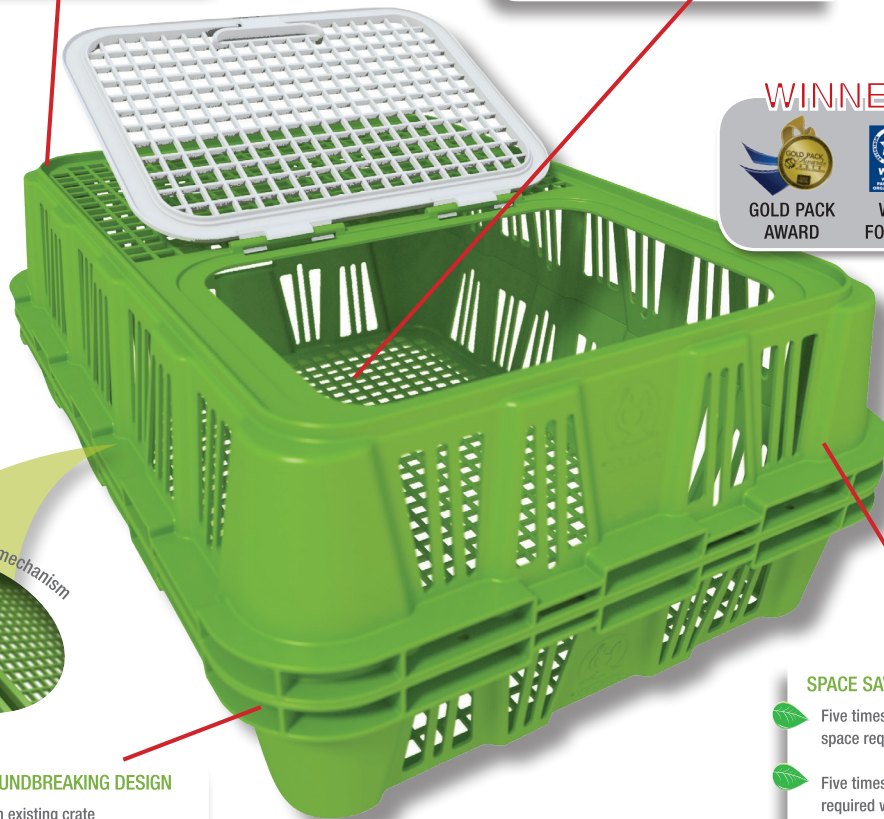
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# SA Poultry Meat IMPORTS

Tariff code report for August 2017

**PLEASE NOTE:**

This report is based solely on SARS verified statistics. Annual figures have been corrected as and when SARS issues amended reports.

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## 1. Annual Poultry Imports

Where the term ‘poultry’ is used, this refers to chicken, turkey, ducks, geese and guinea fowl.

The SA Revenue Service reports that total poultry imports for 2016 amounted to 560 155 t; an increase of 81 708 t, or 17.1 %, in comparison with 2015 (478 447 t). If it had not been for the effect of AI-related trade bans on December imports, 2016 imports would have been 20 % higher than in 2015. Imports in the 1H 2017 were 5 % less than in the 1H 2016; but were 24 % higher than the 5-year average for this six-month period (January to June, 2012 – 2016). Imports to August 2017 are shown in Graph 1.

On an FOB basis, the value of imports for 2016 amounted to R5.48 billion. The FOB value of poultry imports increased by R0.804 billion (17.2 %) over the 2015 value (R4.68 billion).

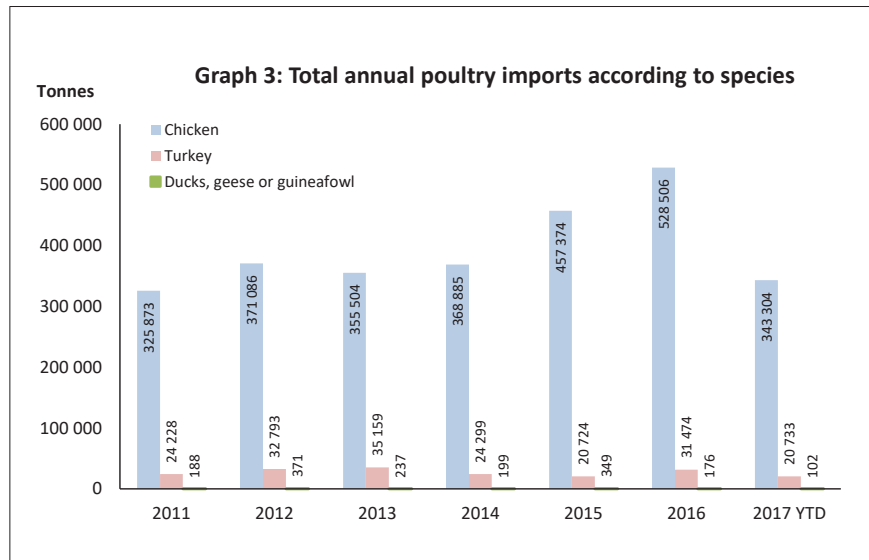
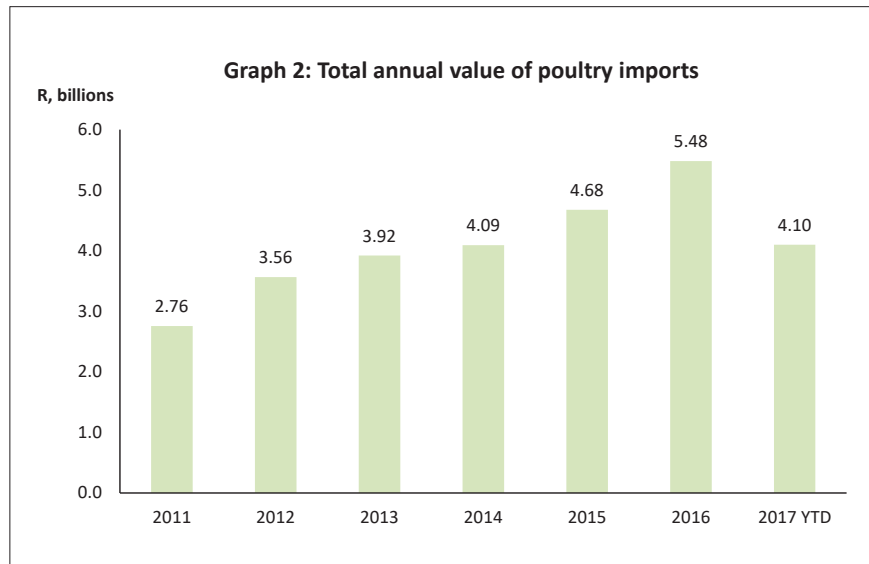
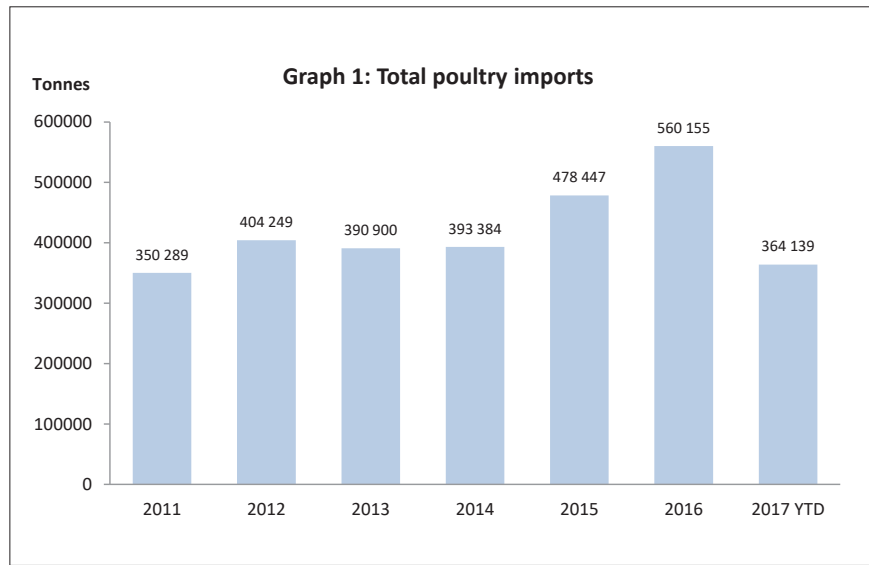
The total annual value of poultry imports into South Africa is given in Graph 2.

In 2016, chicken imports contributed 94.4 % to total poultry imports, turkey imports 5.6 % and ducks, geese or guinea fowl totalled 0.03 %. Annual imports according to the category of species (chicken, turkey or ducks, geese and guinea fowl) are shown in Graph 3.

## 2. Monthly Poultry Imports

### 2.1. Monthly poultry imports in volume and value terms

In December 2016, poultry imports decreased dramatically by 32.2 % on a



monthly basis because of a raft of AI-related trade bans against EU nations. In January and February 2017, poultry imports recovered somewhat as markets adjusted, to 37 375 t and 39 212 t, respectively. March imports then rocketed to record highs of 65 658 t, before moderating to tonnages above 40 000 t but below 50 000 t, April through July. In August 2017, 45 971 t of poultry meat were imported; 1 546 t more than in the previous month (+ 3.5 %; Graph 4).

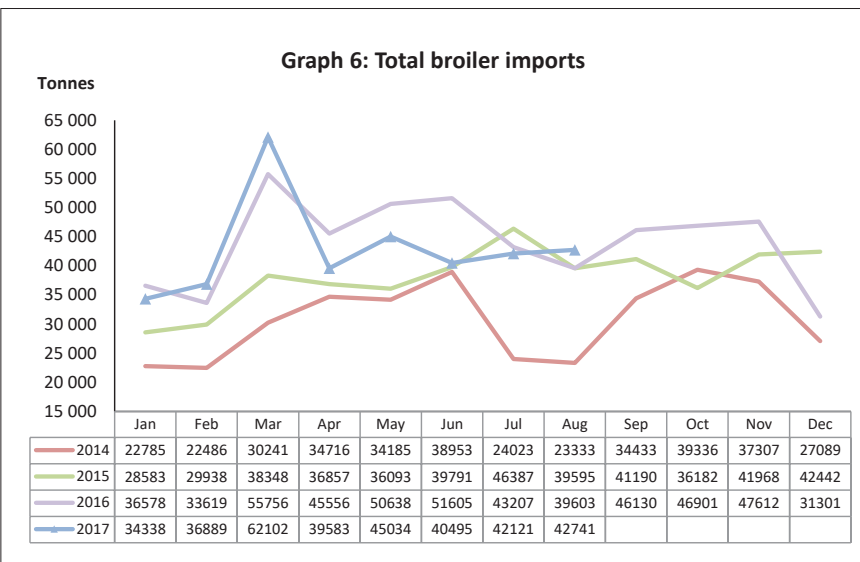
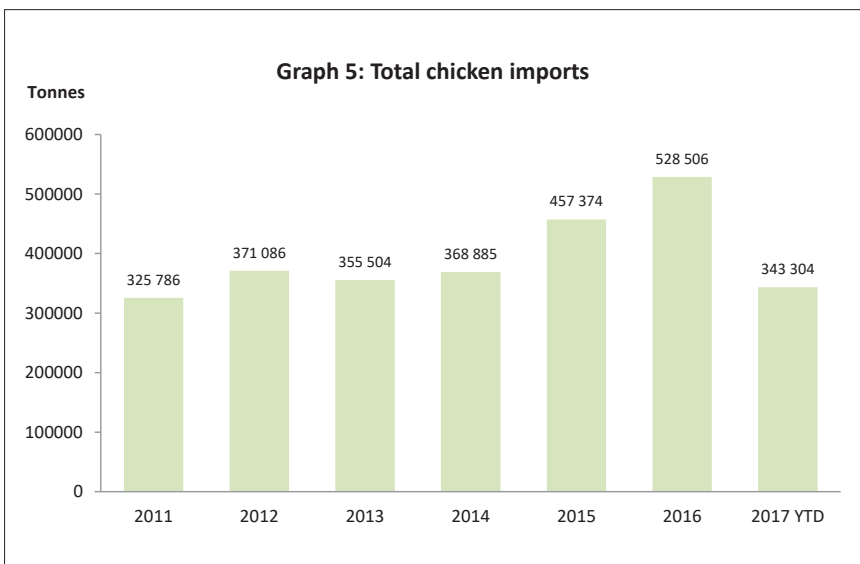
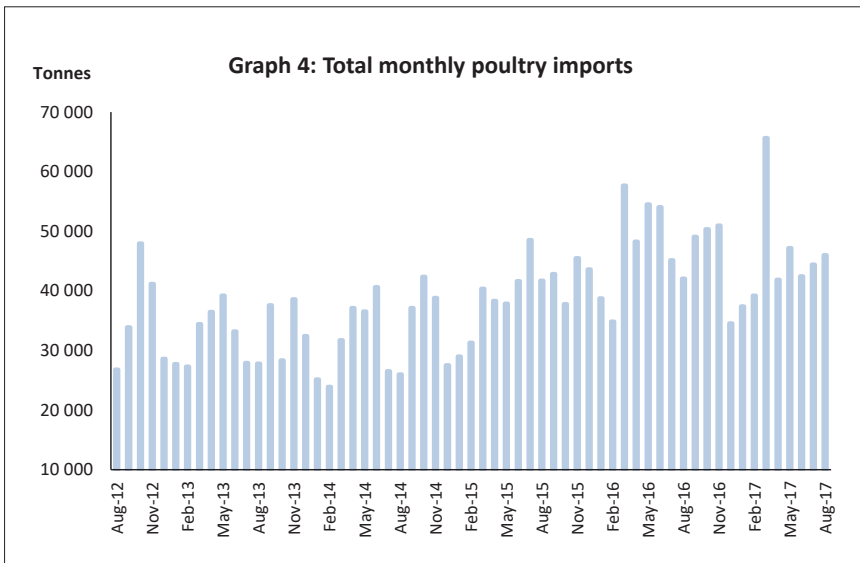
Poultry imports were valued at R537.0 million (FOB); up R43.2 m on July 2017 levels (+ 8.7 %). Compared to the same month in the previous year, imports increased by 727 t (+ 9.4 %), and in, value terms, increased by 37.6 % or R146.6 m.

## 2.2. Classification of poultry imports into chicken, turkey and other poultry imports, according to volume

During August 2017, poultry imports consisted of 93.0 % chicken meat and product, 7.0 % turkey meat and product; and only 0.0003 % ducks, geese and guinea fowl.

## 2.3. Classification of poultry imports into chicken, turkey and other poultry imports, according to FOB value

The FOB value of R537.0 million for poultry imports for August 2017 comprises chicken imports at R485.0 million (90.3 %), turkey imports at R 52.0 m (9.7 %) and imports of other types of poultry at R27 768 (0.005 %).



### 3. Broiler Imports

#### 3.1. Annual broiler imports

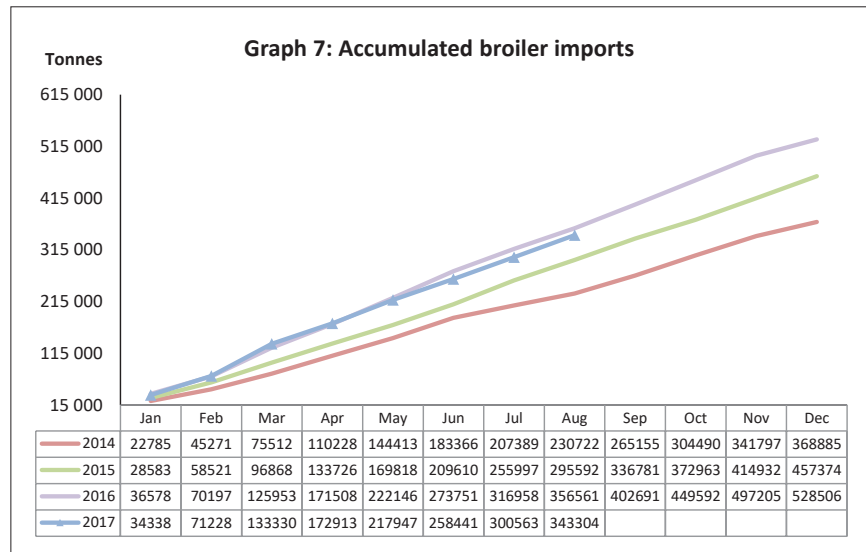
According to the audited figures of SARS, the annual broiler imports for 2016 totalled 528 506 tonnes. This is 71 132 t more than in 2015 (+ 15.6 %; on 457 374 t). Broiler imports for 2017 YTD are included in Graph 5.

Imports for 1H 2017 totalled 258 441 t; 5.6 % lower than in the 1H 2016 but 23.3 % higher than in 1H 2015.

The total annual broiler imports, according to the audited figures of SARS (verified), are shown in Table 1.

#### 3.2. Monthly broiler imports

Broiler imports for August 2017 totalled 42 741 t. This is an increase of 1.5 % on a monthly basis (+ 620 t) and an increase of 3 138 t or 7.9 % when compared to the same month in the previous year. Total broiler imports, on a



monthly basis from January 2014, are shown in Graph 6.

#### 3.3. Accumulated broiler imports in terms of volume

Accumulated broiler imports at the end of 2015 were 88 569 t or 24 % higher than in December 2014. Accumulated broiler imports at the end of 2016, in turn, were

71 132 t or 15.6 % higher than in December 2015. Accumulated broiler imports for 2017 YTD are shown in Graph 7, along with accumulated import volumes for the past three years. Accumulated imports for 2017 YTD are 3.7 % lower than in the first eight months of 2016.

*The full report is available on the SAPA website [www.sapoultry.co.za](http://www.sapoultry.co.za).*

**Table 1. Annual broiler imports into South Africa**

| Unit: kg             | 2012        | 2013        | 2014        | 2015        | 2016        | 2017 YTD    |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total chicken        | 371 000 726 | 354 877 180 | 368 804 925 | 457 373 523 | 528 505 515 | 343 303 555 |
| Total frozen broiler | 369 922 597 | 354 265 914 | 368 201 525 | 456 954 268 | 528 108 226 | 342 882 633 |
| Total fresh chicken  | 49 488      | 50 767      | 5 491       | 48 840      | 0           | 28 005      |
| Total processed      | 1 028 641   | 560 499     | 597 909     | 370 415     | 397 289     | 392 917     |

*Note: Sept 2015; this table was updated to move imports under 0207.1300 into fresh product.*

| Unit: kg                       | 2012        | 2013        | 2014        | 2015        | 2016        | 2017 YTD    |
|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total frozen broiler           | 369 922 597 | 354 265 914 | 368 201 525 | 456 954 268 | 528 108 226 | 342 882 633 |
| Total frozen broiler excl. MDM | 238 605 443 | 212 006 932 | 221 218 214 | 277 063 358 | 332 854 759 | 206 317 996 |
| Total broiler MDM              | 131 317 154 | 142 258 982 | 146 983 311 | 179 890 910 | 195 253 467 | 136 564 637 |

*Note: Sept 2015; this table was audited and corrected.*

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# Local NEWS



**B**umper maize, buyouts, food inflation drops but Cape rain doesn't



Exciting development for KwaMhlanga Poultry.

**C**hemvet, together with BEE company Jokama, have completed a multi-million Rand turnkey project for KwaMhlanga Poultry Farm. The contract involved preparing a greenfield site to construct and equip four state-of-the-art environmentally-controlled poultry houses, each accommodating up to 40 000 broilers.

KwaMhlanga Poultry Project (Pty) Ltd is a broiler production cooperative whose beneficiaries





received land through the land reform process. The project's aim is to revitalise the farm and ensure that it operates at its maximum potential.

The Chemsouth house has some unique features that contribute to ensuring outstanding results, low maintenance, and extended lifespan of the structure. The controlled environment house allows for higher stocking density, which in turn produces more kilograms per square meter - and means more profit for the farmer.

A combination concrete-and-polystyrene wall design retains heat and isolates the

house from the ambient temperature, adding to energy cost saving and resulting in more profit for the farmer.

The option of galvanised steel extends the lifespan of the structure, making the house financially viable over the long term and limiting maintenance to a minimum, leaving the farmer with even more profit - even after a few years of operation.

Making use of high density polystyrene for insulation saves on coal usage to heat the house, while the use of Convector Recuperator heaters together with a smooth ceiling ensures great air mixture

and distribution of warm air horizontally over the flock. Correct construction and proper airtight sealing of the structure helps maintain a negative pressure in the house that results in energy cost savings.

In just the second cycle, the results are testimony of just that, placing KwaMhlanga in fourth position out of the entire group of Daybreak contract growers – ADG 59,37; FCR 1.59; Kg./m<sup>2</sup> 40.44; and PEF 348.94.

Appreciation goes to the Daybreak team of Strini Naidu, Jan van Dijk and Casper Liversage for their input and assistance in making the project the success it is. Daybreak is aiming to become more BEE orientated, and are working towards their Level 1 BEE status. ■

## Bird flu hits Eastern Cape

**S**overeign Foods stated in a SENS announcement in mid-September that it had detected Avian Influenza (AI) at a single layer house on a farm that forms part of the company's→



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broader Uitenhage operations.

Approximately 5 000 birds have been culled, which represent approximately 1% of Uitenhage's production pipeline. Sovereign Foods' management is taking appropriate steps and following prescribed protocols to prevent AI from spreading to other farms. The Hartbeespoort operation in Gauteng remains unaffected at the time of writing. ■

## Importers ask for levy

**T**he National Agricultural Marketing Council has asked the poultry industry for comment by 20 October to the Minister Of Agriculture, Forestry and Fisheries on a levy of R500 per container on imported chicken proposed by the Association of Meat Importers and Exporters (AMIE).

With around R7 million set to be raised in 2017/2018 should the levy be applied, AMIE will use this revenue to finance the development and retention of markets – including exports, industry transformation research and development and quality control, among other activities. ■

## Record maize season

**S**outh Africa has met all prior predictions and registered a record harvest season, with a total grain and oilseed crop of 18.91 million tons - up 101% year-on-year. The estimate for the maize crop came in at an all-time high of 16.41 million tons, consisting of 59% yellow

and 41% white maize. Winter rains, however, have not retained the momentum; the Western Cape is still grappling with persistent drought conditions.

“Weather is critical for price direction going forward with the Western Cape still not out of the woods and the rainfall outlook still pointing to minimal rainfall for the wheat areas in South Africa. The crop has entered a critical stage of development and more moisture is needed for a good crop,” says Paul Makube, Agricultural Economist at FNB.

The short-term outlook shows limited chance of receiving rain in grain areas of South Africa. The medium outlook shows an improvement in the rainfall expectations, particularly for Mpumalanga and KZN, whose optimal planting dates for maize are fast approaching from 1 October to 15 and 30 November respectively. That said, all indications are that a largely normal rainfall season will prevail as the El-Nino prospects that had been noted at the beginning of the year have diminished.

“Apart from the Western Cape water crisis, we still expect a normal rainfall pattern for the rest of the country and therefore there should not be major worries about the late onset of summer rains this year. The season is off to a slow start, but we should see a far more normal season,” he concluded. ■

## Food inflation drops

**F**ood inflation decelerated to 5.7% year-on-year in August 2017 – down from 6.8%

year-on-year in July. Agbiz economist Wandile Sihlobo says this is the lowest level since November 2015, thanks to good summer rain, which led to a higher agricultural output.

“While we expect further moderation in the next few months, the picture of the food basket remains mixed,” says Sihlobo. “All food products have decelerated, except for meat which remains stickier, recording 15.0% year-on-year in August 2017, which is the highest level since December 2011.” ■

## Joburg Zoo on high alert

**T**hreatened and at-risk bird species at the Johannesburg Zoo and other city parks are at severe risk of contracting avian influenza, with the city on full alert and monitoring its valuable collection of birds.

While culling is usually seen as the answer to control the disease spread in an outbreak area, because so many of the birds are endangered or exotic, other measures such as vaccination are being used.

A blue crane had died of Avian Influenza at the Joburg Zoo in early September, four birds in an adjacent cage were culled, and more than 550 dead birds had been collected at the Emmerentia and Westdene dams and incinerated at the Zoo.

The World of Birds in Hout Bay, Cape Town, has also been hard hit by the avian influenza outbreak, while preventative measures have been implemented at the National Zoological Gardens of SA ■



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## Deltamune acquires Food Chain Laboratories

**D**eltamune, a world class South African-based biotechnology company with a focus on veterinary and public health, has announced the acquisition of a 75% share in Food Chain Laboratories (FCL) from the founders and current shareholders Dr Herman Bosman and Janice Giddy. The acquisition was effective from 1 October 2017.

Located in Port Elizabeth, FCL is a privately-owned SANAS and DAFF accredited laboratory that has been offering microbial, serological and molecular testing services since April 2013. The new partnership allows both businesses to offer a more

comprehensive laboratory solution to the animal health and food industry in South Africa. The complete FCL team will remain on board, headed up by Janice Giddy, and is excited to extend the laboratories' accredited services further and offer a greater scope of facilities. ■

## Elanco lets the dogs out

**E**lanco Animal Health's South African team has joined Jerry Selwane and his rangers at the Soweto Animal Rescue and Advisory Centre (SARAC) as part of one of the largest single-day corporate volunteer programs in the world. Elanco has a worldwide goal to invest 200 000 volunteer hours in cause-related efforts between 2014 and 2020. This year, the

Midrand-based team will roll up their sleeves to wash, repair and paint dog kennels as well as the most important job of all – letting the dogs out for a walk and giving them some much needed TLC. ■

## Cargill and Astral in animal nutrition deal

**F**urther expanding its commitment to growth in Sub-Saharan Africa (SSA), Cargill is acquiring full ownership of the Provimi-branded Cargill Premix & Nutrition SSA business from Astral Foods.

Cargill – through an investment it made in 2012 – owned 75 percent of Provimi-branded Cargill Premix & Nutrition as part of a joint venture with Astral Foods. As

part of that investment and to reinforce its commitment to SSA, Cargill built a new premix and base mix facility in Pietermaritzburg. It also assumed managerial control of NuTec Southern Africa at that time and migrated its name and product portfolio into Cargill's Provimi brand. Today, Cargill has taken that investment one step further by acquiring the remaining 25 percent of that company.

"This acquisition is an important decision for us and plays a significant role in helping Cargill realise our larger growth plan for Sub-Saharan Africa," said Guillaume Smeets, managing director for Cargill's animal nutrition business in Middle East and Africa. "Moving our investment from a joint venture to full ownership further reinforces our commitment to support our customers, grow our workforce and reinforce the growing agricultural sector in the region."

"This deal allows Astral to focus on its core business as an integrated poultry company, whilst at the same time accessing the great asset Cargill built in South Africa

through the supply of vitamin and mineral products and various feed additives, along with technical support to ensure the optimal performance of our poultry genetics," said Gary Arnold, Astral's business development director. ■

## Eskom seeks 20% increase

**T**he National Energy Regulator of South Africa (NERSA) has gazetted Eskom's revenue application for 2018/2019. Given allegations of widespread corruption and fraud within the state-owned monopoly power supplier, companies and organisations are encouraged to submit comments before the closing date of 13 October 2017.

Dr John Purchase of Agbiz says since 2010, the organisation has continuously advised its members to develop energy security strategies for their businesses - a call that remains relevant given the 19,9% tariff increase asked for by Eskom. ■

*The articles above have been written or compiled by the Editor and do not necessarily represent the views, opinions or positions of SAPA.*



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# Herbs improve eggshell QUALITY

**H**erb supplements can improve table egg quality

**T**he avian eggshell is a complex natural biopolymer of mineralised and non-mineralised matrix. The egg shell constitutes some 9-12% of total egg weight. Good quality egg shells contain approximately 2.2g of calcium in the form of calcium carbonate and about 95% of the dry egg shell is calcium carbonate.

The average eggshell contains 0.3% phosphorus and 0.3% magnesium and traces of sodium, potassium, zinc, manganese, iron and copper. If the calcium from the shell is removed, the organic matrix

material is left behind.

This organic material has calcium binding properties and its organisation during shell formation influences the strength of the shell. The organic material must be deposited so that the size and organisation of the crystalline components (mainly calcium carbonate) are ideal, thus leading to a strong shell.

### Calcium metabolism

The multi-factor mechanism of transfer of calcium ions to the egg shell consists of a vitamin D dependent absorption of calcium ions that is calbindin (calcium binding protein) mediated. Calbindin acts as a cytosolic facilitator of calcium ion diffusion from the brush border membrane to the basolateral membrane.

The induction of calbindin gene expression in the egg shell gland (ESG) is predominantly calcium dependent. In addition to the induction of calbindin-D synthesis, vit-D3 (1,25(OH)2D3) exerts other effects on the intestinal epithelium that can have consequences on the calcium absorptive process.

There is defect in vitamin D metabolism or calbindin gene expression in old hens responsible for thin-shells. Aged hens absorb calcium with a lower efficiency due to lesser synthesis of 1,25-hydroxycholecalciferol (1,25(OH)2D3), a defect in the hen's ability to alter calbindin synthesis in response to calcium needs and less duodenal and eggshell gland (ESG) calbindin than normal laying hens leading to formation of light uncalcified shells.

### Egg shell quality

#### Early and late layers

Early onset of production is associated with physiological calcium deficiency as indicated by increases in kidney-1-hydroxylase and duodenal calbindin in early layers as compared with late layers. Early layers exhibit a more severe reduction in shell quality, when compared with late layers, as a result of calcium deficiency.

In one of the studies, feeding pullets with a pre-lay diet containing 3.9% calcium did not affect the performance or shell quality during the whole productive period, whether the birds started to lay early or late.

#### Synergistic and antagonistic influence of dietary ingredients on calcium utilisation.

In diets with a distorted calcium:phosphorus ratio (low phosphorus concentration of 3.2g/kg with a high calcium content of 35-45g/kg) the interaction between calcium and phosphorus is manifested by strong performance depressions and a high

mortality at combinations.

A dietary phosphorus content of 4.5g/kg (1.0g/kg added inorganic phosphorus) is sufficient for maintaining egg production and shell quality in aged laying hens given 36-40g/kg calcium. Increasing dietary calcium above 40g/kg may require higher dietary phosphorus content. However, very high phosphorus content in the feed and excess chlorine may have a negative effect on eggshell quality. It is reported that these two elements act negatively on egg shell quality through their influence on acid base balance (pH) in the blood.

The importance of adequate vitamin D intake by the hen is thus obvious and it is essential for proper calcium and phosphorus absorption. Excess vitamin D and its metabolites have not been shown to benefit eggshell quality when normal hens are already consuming adequate vitamin D.

#### The saline drinking water and shell thickness

Increase in salt intake through the drinking water or the food is also known to reduce shell thickness and calcium absorption. Sodium chloride given in the drinking water

**Table 1 depicts the egg shell quality traits of hens fed different levels of vitamin D in thermo neutral conditions.**

| Characteristics   |                      |                      |                              |
|-------------------|----------------------|----------------------|------------------------------|
| Vitamin D (IU/Kg) | Shell Percentage (%) | Shell thickness (mm) | Specific Gravity (h/ml. H2O) |
| 2500              | 8.17                 | 0.42                 | 1.082                        |
| 3000              | 8.38                 | 0.43                 | 1.083                        |
| 3500              | 8.47                 | 0.43                 | 1.083                        |

*Table 1: Egg shell quality traits of hen fed different levels of Vitamin D in thermo-neutral conditions (24-27°C).*



reduces shell quality and increasing plasma calcium and phosphorus more than when sodium chloride given in the food.

#### Heat stress

For layers, the main consequences of heat stress are a reduction in feed intake, a decrease in intestinal blood flow and ionised calcium levels in blood, a reduction in partial pressure of carbon dioxide and interference in gonadotrophin releasing hormone action, the hypothalamic hormone that regulates the release of leuteinising hormone.

Eggshell thickness decreases markedly during heat stress. There is calcium and phosphorus loss due to acid base imbalance and alkalosis of the blood due to loss of excessive amounts of carbon dioxide by panting.

Egg weight falls by about 0.4% per °C between 23 and 27°C; above 27°C the decrease is about 0.8% per °C rise in environmental temperature.

Growth at point of lay is reduced above 24°C, and is extremely low above 28°C. Rate of lay is generally only affected above 30°C. Feed conversion ratio is optimal at a temperature of about 28°C. Above 28°C FCR deteriorates, because of the failure in production.

#### Potential problems

Problems with the quality of eggs and egg products have the potential to cause human health risks and undermine the confidence of consumers in the quality and safety of the product. Accurate assessments of eggshell quality may, therefore, allow the producer to vary one or more of these factors that influence eggshell quality in order to improve product quality.

Egg shells are evaluated on the basis of cleanliness, shape, texture, and soundness. Traditionally, eggshell quality has been defined in terms of the ability of an eggshell to resist breakage. Breakage

or cracking of eggshells in market channels is a serious concern. Cracks result from a combination of shell strength and integrity disruption during careless handling. Other egg shell quality factors such as the formation of abnormal ridges, calcium deposits, or body checks (ridges) are important considerations in determining egg shell quality.

#### Quality production

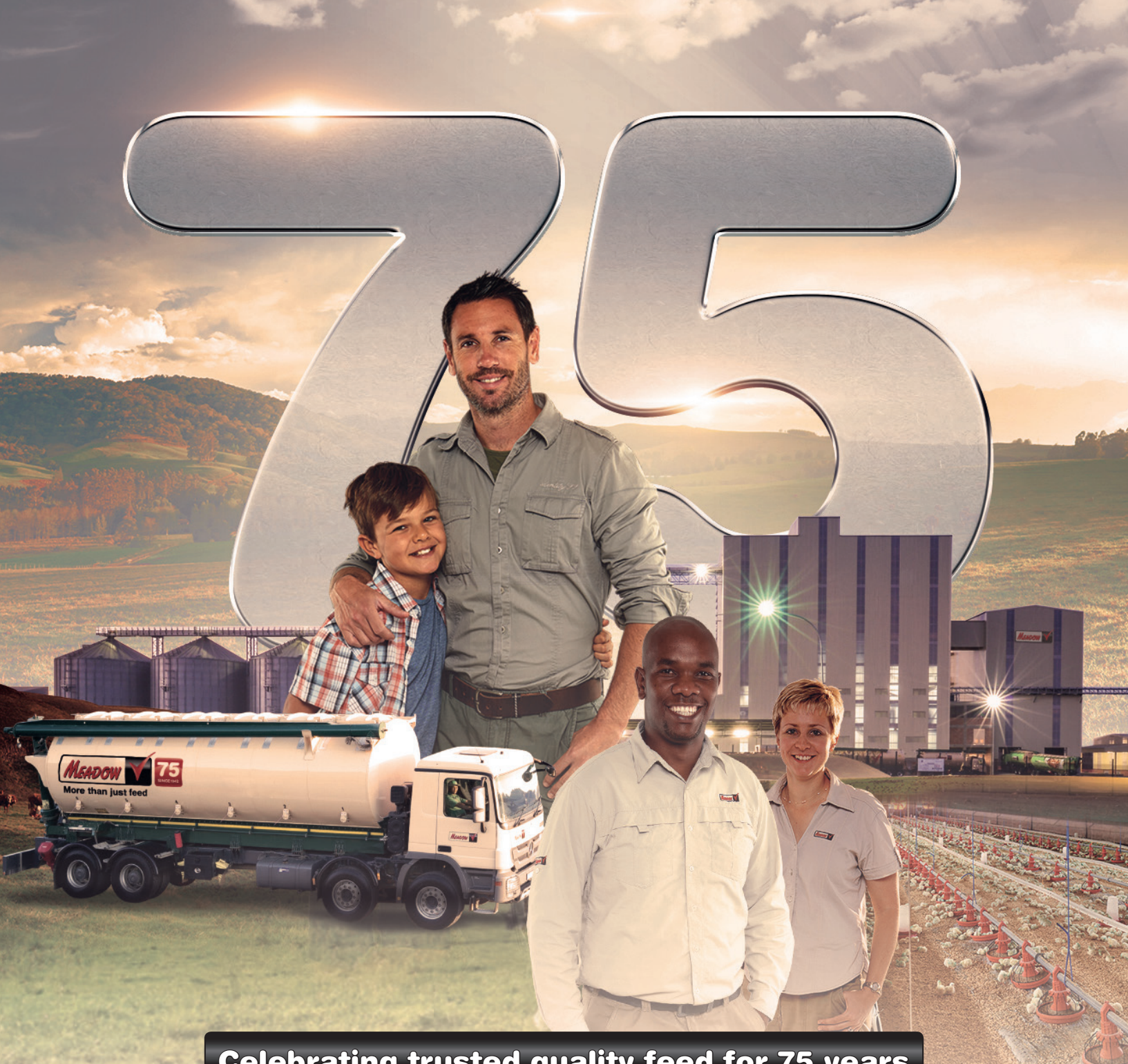
Management plays an important role in the production of eggs of high quality. To ensure the production of high quality eggs, the following factors are important:

- Select a strain of birds known to produce eggs of good quality because egg quality is a heritable characteristic.
- Avoid prolonged periods of temperature above 30°C in the laying house, if possible. Practice the necessary steps to prevent disease and other physiological disturbances in the flock.
- Use high quality feeds and adjust feed formulations according to feed intake and the age of the hens.
- Ensure sufficient bioavailability of calcium and phosphorus for egg shell formation by adequate supplementation of calcium, phosphorus, vitamin D3 and proteins.

#### Nutritional adjustments

Dietary manipulation is the primary means for minimising the natural deterioration of period. The pre-lay feed is an →





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intermediate feed between developer and layer feed.

The calcium content should be 2% with 50% of this amount in particles (from 2 - 4mm) during pre-lay period. Solarte et al. (2006) also reported that dietary calcium requirement for white laying hens from 46 to 62 weeks of age was 3.56% in the diet or 4.02g calcium per hen daily with the average ambient temperature of 21.65°C .

The intensive deposition of calcium occurs during the last part of the day and during the night. Calcification is completed for 80% of the birds two to three hours after lights on.

The higher the feed intake and the calcium intake in the afternoon, the higher the calcium deposition and, therefore, the stronger the egg shell. An adapted feeding timetable based on this knowledge will reduce the mobilisation of the calcium from the medullary bone.

The introduction of a period of light in the middle of the night improves the shell quality by allowing the hen to replenish her calcium reserves at a key time. Eggshell quality depends to a large extent on the quantity of calcium remaining in the gizzard at the end of the calcification process and, therefore, towards the end of the night.

Absorption of calcium and its availability in the gizzard can be enhanced by the addition of certain herbs in the diet.

### Herbal solutions

**M**any herbs are known to positively influence the absorption and assimilation

of minerals such as *Cissus quadrangularis*, *Zingiber officinale*, *Lepidium sativum*, *Terminalia arjuna*, *Cestrum diurnum* and *Uraria picta*. *Cissus quadrangularis* is a medicinal and culinary plant native to India and Africa. It is reported that aqueous extracts of plant *Cissus quadrangularis* have calcium and phosphorus mineralisation properties and this helps early completion of calciferous process and remodelling phenomenon. Its anabolic steroidal principles ( $\beta$ -sitosterol,  $\delta$  amyron and  $\delta$  amyryn) have marked antistress activity. Udupa and Prasad, 1964, also reported the same while doing radioactive Ca45 uptake studies of *Cissus quadrangularis*.

The presence of calcium and phosphorus in the plant can also be exploited for synthesising calcium carbonate and hydroxyapatite, an important constituent for egg shell formation. Many isotopes such as S35, P32, Sr85 and Ca45, have been used in the study of utilisation of minerals such as calcium and phosphorus by supplementation of various herbs.

In one study, two weeks supplementation of *Uraria picta* was reported to show maximum deposition of P32 due to its mineralisation properties when compared to the control in albino rats .

Similarly, *Zingiber officinale* and *Lepidium sativum* are a rich source of minerals and have good immunomodulatory properties. *Zingiber officinale* contains 1.2% minerals on dry matter basis (Ca 20%, P 60%, Fe 2.6mg/100g in addition to traces iodine and chlorine) and *Lepidium sativum* is a

rich supplement source of phosphorus (1.65%), calcium (0.31%) and sulphur (0.9%).

These herbs can be supplemented in layer diet as a rich source of minerals for good quality egg shell formation.

Leaves of *Cestrum diurnum* have also been explored as a source of 1,25(OH)2D3 in the feed of layer birds for improving the egg shell thickness, specific gravity and weight. Incorporation of 0.3% *Cestrum diurnum* significantly ( $P < 0.001$ ) improved the egg shell thickness and increased specific gravity by 0.5%. In another experimental study, Dhakel

and Madhav, 1998, also documented an increase in uptake and utilisation of dietary Ca and P and regulation of calcium mobilisation from skeletal system to the shell glands, after three weeks supplementation of herbal ingredients of *Uraria picta*, *Lepidium sativum*, *Cissus quadrangularis*, *Zingiber officinale* in broiler breeders, thus improving the external egg shell quality in terms of % production, porosity and shell thickness. Mandelkar et al also reported similar findings of improvement in laying performance attributing it to synergistic action of herbs.

Thus, it can be concluded that good management practices and nutritional adjustments with supplementation of herbs can improve table egg quality by enhancing egg shell strength. ■

*This article was authored by Dr Shivi and Dr Ali Asgar of Ayurved Ltd, Delhi, India and is reproduced here with the kind permission of Nigel Horrox of Positive Action Publications.*

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# Dangerous interactions

## Mycotoxins in the gastrointestinal tract

The gastrointestinal tract (GIT) has complex conditions in which different factors ranging from changes in pH to microbiota interact with mycotoxins and can influence their effects. It is also the first physiological barrier to any harmful substance in the feed. The entire load of mycotoxins is directly in contact with the epithelium of the GIT; therefore it is exposed to their effects even if they are at low concentrations.

### The intestinal epithelium

The intestinal epithelium consists of a single layer of cells lining the intestinal lumen, which has two conflicting functions: it must be permeable enough to allow the absorption of nutrients and on the other hand, it constitutes an important barrier to the external environment, preventing the passage of harmful substances like virus, microorganisms and toxins.

### Mycotoxins

The first contact of any contaminant that may be in the feed, such as mycotoxins, is with the intestinal epithelium, as it is the tissue/barrier to which it will be fully exposed after ingestion.

Most mycotoxins are absorbed in the proximal part of the gastrointestinal tract; this absorption can be high, as in case of aflatoxins (>90%), or very limited, as with fumonisin (<1%), and most mycotoxins are absorbed in rates lower than 60%. Consequently, a significant portion of the unabsorbed toxins remains within the lumen of the gastrointestinal tract.

Part of the mycotoxins that enter the intestinal lumen can be transformed to less toxic compounds by the action of certain bacteria; this takes place predominantly in the large intestine and therefore there is no detoxification before absorption. Moreover, the absorbed mycotoxins can re-enter the intestine through the intestinal epithelium or the enterohepatic circulation, which increases their exposure.

The consequences of mycotoxin damage in the gastrointestinal tract cells range from impaired intestinal func-

tions to the passage of antigens (viruses, bacteria, toxins) into the bloodstream; this can create an inflammatory response or pathogenic disorders in animals. An important remark is that the mycotoxin challenges necessary to cause this damage are lower than the levels reported as safe by the Food Safety Agency of the European Union (EFSA).

**Alteration of the function and morphology of the intestinal barrier:** Several studies indicate that mycotoxins such as aflatoxin B1, DON, fumonisin B1, ochratoxin A and T2, are able to increase the permeability of the intestinal epithelium of poultry and swine. As a result there is an increase in the passage of unwanted elements into the bloodstream such as bacteria, viruses and toxins, thus susceptibility to infectious enteric diseases is increased.

**Impaired immune function in the intestine:** The intestine is a very active immune site, where several immuno-regulatory mechanisms simultaneously defend the body from harmful agents. Immune cells are affected by mycotoxins such as aflatoxin, DON, fumonisin, T2, and Zearalenone through the initiation of apoptosis, the inhibition or stimulation of cytokines and the induction of oxidative stress.

**Necrotic enteritis:** One of the most widespread problems of bacterial origin is necrotic enteritis caused by *Clostridium perfringens*' toxins. Today it is more common in the subclinical form, characterized by intestinal damage without significant increase in mortality, but it comprises a low absorption of nutrients, intestinal lesions and reduction in body weight gain. Any agent capable of causing a disruption of the gastrointestinal epithelium -among them mycotoxins such as DON, T2 and ochratoxin- promotes the development of necrotic enteritis; the inhibition of the intestinal immune also promotes the development of this disease.

### Intestinal Health

Mycotoxins, even at levels considered safe by the European Union, can compromise different intestinal functions such as absorption, permeability, immunity and microbiota balance, resulting in lower productivity and poor animal health.

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## Mastering Toxins

The use of an adsorbent which combines anti-mycotoxin and anti-bacterial toxin properties is an alternative that adds value against these challenges. Mastersorb<sup>®</sup> Gold (EW-Nutrition GmbH) has been subject to studies for the adsorption of mycotoxins and bacterial toxins.

The adsorbent was tested in vivo in broilers orally and individually challenged with a solution of *C. perfringens* at the days 3 and 4 of life ( $10^8$  CFU). At day 21 alpha-toxin antibodies were measured in the serum (Fig. 1). Besides showing a lower challenge, the broilers that consumed Mastersorb<sup>®</sup> Gold had better production parameters.

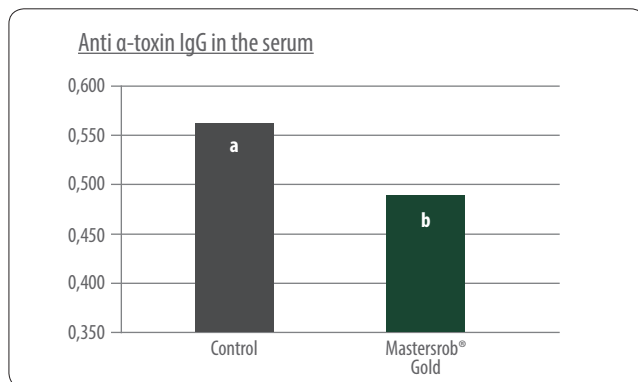


Fig. 1 *C. perfringens* alpha toxin antibody (IgG) in the serum of broilers at 21 days of age under a *C. perfringens* challenge and diets with and without Mastersorb<sup>®</sup> Gold

From the perspective of human health, the colonization of the intestine of food producing animals by pathogenic strains of *E. coli* and *Salmonella* -enhanced by the ingestion of certain mycotoxins- may increase the vertical transmission of pathogens. Thus, the maintenance of a healthy gastrointestinal tract is crucial because it ensures that the nutrients are absorbed at optimum rate, provides effective protection against pathogens through its own immune system, and maintains the microflora in suitable proportions and numbers.

Mycotoxins play an important role in the balance of intestinal health in animal production; the efforts made to maintain low levels or to promote their adsorption, avoiding direct contact with the gastrointestinal epithelium, will be reflected in better health, welfare and productivity of animals.



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# Inter- national NEWS



Artificial peptide molecules inhibit A1 strains

**A** recent study published online in 'Science' reveals that scientists have developed artificial peptide molecules that can neutralise a broad range of influenza virus strains.

The peptides - short chains of amino acids - are like proteins but with smaller, simpler structures. The designed molecules have the potential to be developed into medicines that target influenza.

The researchers from the Scripps Research Institute

**B**ird flu tops agenda with welfare close behind



and Janssen Research and Development say the development of broad-spectrum inhibitors, including some avian influenza strains, is extremely promising in the ongoing battle to prevent a global epidemic.

The developed peptides block the infectivity of most circulating strains of group 1 influenza A viruses, including the bird flu strain H5N1, which has caused thousands of infections and some human deaths in Asia.

The peptides are designed to mimic two recently discovered 'super-antibodies' that can neutralise influenza A strains. While antibodies are expensive to produce, and must be delivered by injection or infusion, the peptides developed have the potential to be delivered via pill-based drugs in the future, and showed high-binding affinity for a broad set of group one

influenza A viruses, as well as a potent ability to neutralise infections with these viruses in laboratory experiments. ■

## NZ egg producers face closure

**N**ew Zealand egg producers are concerned over the pace of the switch to cage free production that is raising fears over possible ruin for some of the country's 145 commercial egg farmers.

Currently, around 75% of eggs sold are from caged systems, with free-range, barn and organic responsible for the remainder. Cage egg sales per dozen were up 6.5% from last year compared to just 2.5% for free range, although farmers face having to phase out conventional caged systems between now and 2022, with New Zealand's two largest

supermarket chains saying they are responding to consumer pressure to sell only free range and barn eggs in the next 10 years.

Speaking at this month's International Egg Commission annual conference in Bruges, Michael Guthrie, managing director of Mainland Poultry, which produces one third of New Zealand's eggs, said there was considerable upheaval in the sector.

"We are seeing some disruption in the market and can expect to see a roller-coaster ride in the next 18 months," said Guthrie. "We are legally able to go to colony in the light of phasing out conventional cage systems by 2022, but our supermarkets have buckled under animal welfare pressure." ■

## Brazil charges Batistas

**A**uthorities in Brazil have formally requested prosecutors to bring insider trading charges against food giant JBS' Wesley and Joesley Batista, which if proven, could result in the pair being jailed for the offence.

Allegations are that the brothers profited to the tune of \$44 million when they sold shares before information on bribery allegations was made public. ■

## Expo concerned over AMR and disease

**T**he Rwandan Poultry Africa Expo has heard concerns expressed over the failure by





developing nations to address antimicrobial resistance (AMR) in poultry, and the devastating effects that highly pathogenic avian influenza has had on the continent.

Scientists are concerned that small-scale farmers in Africa do not have the skills or understanding to control and better manage their farms.

Mohammad Rafiqul Islam, principle scientific officer for livestock at Bangladesh Agricultural Research Council, said people in developing countries were using antibiotics whenever there was a disease outbreak, without accurate testing. The consequences of AMR include failure to successfully treat infections leading to increased mortality; more severe or prolonged illness; production losses; reduced livelihoods and food security; and higher costs of treatment.

“We need to come up with strong preventive measures to contain poultry diseases and to boost financial support for preparedness and response efforts in Africa and globally,” said Edir Silva, former president of the World Poultry Science Association.

The UN’s Food and Agriculture Organisation says bird flu outbreaks have been confirmed so far this year in Burkina Faso, Cameroon, Cote d’Ivoire, Democratic Republic of Congo, Ghana, Niger, Nigeria, Togo, South Africa, Uganda and Zimbabwe. ■

## Less antibiotic use in UK

**S**ales of antibiotics in the UK for livestock have fallen to a four-year low, a development that has placed the agricultural sector on track to meet targets to tackle antibiotic resistance.

Overall sales of antibiotics by weight dropped by 9% from 2014 to 2015, while sales for livestock dropped 10%, said the country’s governmental body, Defra. This continues a 10-year decline and puts the UK on track to reach its 50mg/kg target by 2018.

As well as the overall reduction, the Defra report shows decreased sales of the highest priority antibiotics described as ‘critically important for humans’. Sales of these made up just over 1%

of all antibiotics sold for use in animals during 2015.

“Antibiotic resistance is the biggest threat to modern medicine and we must act now to help keep antibiotics effective for future generations,” says Defra minister Lord Gardiner. “This report shows the hard work of our vets and farmers is already making a real impact.” ■

## Feathers fly at Cherkizovo

**L**eading Russian poultry and pork producer, Cherkizovo, faces a detailed investigation by law enforcement agencies into allegations that the company used illegal offshore finance schemes for paying dividends and lowering taxes.

Russia’s Ministry of Internal Affairs, claims the government has lost over \$5 million in taxes owed as a result, although Cherkizovo has denied all accusations. ■

*The articles above have all been compiled by the Editor and do not necessarily represent the views, opinions or positions of SAPA.*





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De Heus has set itself the goal to anticipate this development by producing feeds to maximise the laying periods in older layers. The Research & Development division of De Heus is constantly doing research at its own experimental facilities. This research has shown that for older hens to maintain a high level of production they must be fed correctly as pullets.

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Taking this information into consideration, De Heus has optimized its full range of Layer 500 feeds, in order to give older hens that extra push. The stabilization of the egg weight, calcium utilization and the support to the liver plays a basic and critical role in these developments. Since 50 week old hens have reached the peak of their productive life, it pays to invest in these hens.

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prove the importance  
of eggs



**G**lobal celebrations are in place for the 22nd World Egg Day, celebrated

on the 13 October 2017. Established by the International Egg Commission in 1996, World Egg Day was created to promote the egg internationally. Now well recognised throughout the world, every year on the second Friday of October, countries all around the world celebrate the versatility and the health benefits of the egg, the small but mighty food source with the potential to feed the world.

National eye awareness month  
23 September –  
20 October

**T**wo decades of follow-up of more than 100,000 participants in the Nurses' Health Study and the Health Professionals Follow-up Study found that higher intake of bio-available carotenoids, particularly lutein and zeaxanthin and alpha-carotene, are associated with a reduced risk of advanced age-related macular degeneration (AMD).

AMD is caused by damage to the macula, a central area in the retina that is important for sharp, central vision. Lutein and zeaxanthin accumulate in the macula and are thought to protect against damaging blue light (originating from sunlight, indoor lightening, TV and computer screens, etc.). Research suggests that low levels of these pigments within the eye may increase the risk for developing AMD. AMD is a leading cause of blindness in the United States and affects over 10 million people.

Lutein and zeaxanthin

can be found in green leafy and yellow vegetables, as well as egg yolks. While concentrations are lower in eggs than vegetable sources, the bioavailability of these compounds is much higher from eggs and research has shown that regular egg consumption increases both serum and macular levels of lutein and zeaxanthin.

Research has also shown that consuming cooked whole eggs with raw salad vegetables greatly increases absorption of a variety of carotenoids, including lutein, zeaxanthin and alpha-carotene.

Even more evidence

**A** new study, published in the Journal of Clinical Research and Ophthalmology, looked at the effects of eating 12 eggs per week on aspects of vision among people with early age-related AMD.

In this 12-month study, researchers evaluated several aspects of eye function as well as serum concentrations of lutein and zeaxanthin. Findings include a significant improvement in glare recovery following the egg intervention, a measurement that quantifies the time it takes the macula to return to normal function following exposure to a bright light. Egg consumers also showed an 83% increase in serum zeaxanthin concentrations compared to baseline. There were no changes in the control group.

This study adds to the body of evidence that a simple change in one's diet can help prevent or slow down the progression of disease. ■

# Today in **THE USA**



**C**obb invests, Perdue and Simmons expand, Tyson doesn't



## Cobb funds the future

**U**S poultry producer Cobb Vantress has announced a \$250,000 endowment aimed at helping those looking for a career in the poultry sector.

The quarter of a million Dollars will be paid to the Cobb-Vantress Fellowship Endowment over three years, and will support students interested in completing their Masters or PhD degrees in poultry science.

“We recognise the critical need for talented young scientists in the poultry breeder and poultry production industries,” said Cobb-Vantress president Joel Sappenfield. “We’re committed to encouraging future generations

of young poultry professionals and helping them achieve their greatest potential.”

## Big fine for Tyson

**T**yson Poultry has been fined US\$2 million and two years probation for its role in an environmental incident in Missouri that led to the death of over 100 000 fish.

The incident happened at the Aurora Feed Mill, where a tank used to store Alimet (a feed ingredient with the pH of less than one) sprang a leak that resulted in the substance flowing into another containment area. A contractor subsequently removed the Alimet to Tyson’s Monett plant where the ingredient was discharged into a system not designed to treat waste with Alimet’s characteristics. Some of the Alimet found its way into the city’s municipal waste water treatment plant, killing bacteria that reduced ammonia in discharges into a local creek and killing more than 108 000 fish.

## Cargill's profits rise

**S**trong demand for beef has boosted the quarterly profits of Minneapolis-based agricultural commodities giant, which posted \$973 million in earnings for the period ended 31 August, a 14% year-on-year increase.

Worldwide poultry is slightly behind beef sales after a weaker performance in Central America dented strong US and South East Asian demand for Cargill’s chickens, turkeys and ducks.

## Soybean plant creates 500 jobs

**P**erdue Farms subsidiary, Perdue AgriBusiness, has opened a US\$60 million soybean processing plant in Pennsylvania that promises to support hundreds of local jobs, create fresh opportunities and result in lower greenhouse gases for the state’s existing soybean operations.

“This demonstrates our shared commitment to ensure agriculture remains strong and farmers have the advantage they need to remain competitive,” said company chairman Jim Perdue.

## Chicken for Arkansas

**T**he construction of a new, \$300 million chicken facility in Arkansas by Simmons Prepared Foods will create up to 1 500 new jobs. This will bring total employment at the Benton County enterprise to more than 2 300.

Joining other Simmons’

operations in the area - a feed mill, hatchery, Propane business, chicken processing facility and dry pet food production facility - the new plant will produce fresh and frozen chicken products for restaurant and retail customers.

## No bond to build

**T**he withdrawal of support by the local authorities in Tonganoxie, Kansas, means that Tyson Foods is “evaluating its options” to relocate its new poultry complex to Leavenworth County, whose commissioners decided to rescind a resolution of intent to issue \$500 million in industrial revenue bonds to build the facility.

The plan had met some opposition from local residents on the grounds that “Tyson Foods has a poor history of unethical treatment of its employees, inhumane treatment of animals, water and air pollution, over-stressing school and city/county resources, and decreasing home values”.



**KNOWLEDGE**

**SKILLS**

**LEARNING**

**GOALS**



**ABILITY**



**GROWTH**



By Christopher Mason

# Training & DEVELOP- MENT

**A**s I sit here writing this article, the first meaningful rainfall is removing the Highveld winter dust and grime and, of course, adding some interesting driving challenges to us Johannesburg drivers. There are still areas in the country desperate for rain

and the latest prediction is that the Western Cape is likely to run dry by March 2018 if no further rainfall is received. As South Africans, we have no choice but to become more water savvy. We live in an exceptionally dry country with occasional good rains, and need to do whatever we can as a



nation to conserve and protect this valuable resource.

## World Egg Day

October is egg month, with World Egg day celebrated around the world on 13 October.

For those who do not know the significance of World Egg Day, it was established at the IEC Vienna 1996 conference when it was decided to celebrate World Egg Day on the second Friday in October each year.

For centuries, eggs have played a major role in feeding families around the globe. They are an unbeatable package when it comes to versatility and top-quality protein at a very affordable price. And they are also an excellent source of choline, essential in memory and brain development. When you factor in convenience and terrific taste, there is just no competition.

Eggs are one of nature's highest quality sources of protein, and indeed contain many of the key ingredients for life. The proteins contained within eggs are highly important in the development of the brain and muscles, have

a key role to play in disease prevention and contribute to general well-being.

Lastly let's all spare a thought for every producer and person affected by the H5N8 avian influenza outbreak currently wreaking havoc in the sector.

## 2018 AgriSETA Discretionary Grant funding

AgriSETA was established as the Sector Education and Training Authority for the economic sub-sectors that include primary and secondary agriculture through the Skills Development Act of 1998.

### 2018 Academic Year & 2018/2019 Financial Year

#### *Bursaries, Internships, Learnerships And Artisan Development Window Period*

Please Note: Learnerships 18.1 and 18.2 applications shall also be included in this window period, the rest of learning programmes shall

be during November to January application window period. AgriSETA invites all AgriSETA levy paying employers, Commodity Organizations, NGO's, CBO's, Community Based Cooperatives and small BEE firms to forward applications for Bursaries, Internships, Artisan Development and Learnerships 18.1 and 18.2 and NVC.

*Please note - due to the high volume of applications received by agriseta in the past, stakeholders are advised to limit applications to absolute scarce and critical skills as per nsds iii Guidelines*

- Only attached application form will be accepted which can be found under the Skills Delivery menu, AgriSETA Learning Programmes. [www.agriseta.co.za](http://www.agriseta.co.za)
- Applications are open from the 01 September 2017 to 31 October 2017.
- Applicants will be informed of the outcomes during December 2017 / January 2018.
- Only properly completed and signed application forms shall be considered for evaluation.





- Learners should be supported by Employers in the agricultural sector in completing the (Employer section) of the application form.
- Attach all required documentation with your application (not CV's).
- From 1 September 2017, AgriSETA will introduce Online application system, please visit AgriSETA website, Home Page,
  1. Indicium (Red) - Sdf/ User Logon,
  2. Online Discretionary Grant Application.
- Upload all signed documents when using online application system.
- No late application will be considered.

#### Notes for Bursaries

1. Please note that only agricultural related qualifications shall be supported for unemployed learners while ONLY levy paying companies can apply for other qualifications supporting their enterprises.
2. Employed learners may ONLY apply for funding limited to their actual

- expenses related to the learning programme.
3. No funding shall be provided to students who receive funding from other Government sources.
4. During application, proof of academic record, certified ID copy and proof of admission from the learning Institution are required.
5. Once approval is granted, proof of contract between the learner and the employer (during contracting), proof of registration and fees breakdown structure for unemployed learners.
6. Priority shall be given to Scarce and Critical skills / Occupations in the agricultural sector such as: (Please see a list of Scarce and Critical skills on [www.agriseta.co.za](http://www.agriseta.co.za)), example:
7. Please provide the 2017 Examination results when applying for bursaries.
8. Learners who have been funded the previous year and would like to continue with the same qualification, are supposed to re-apply (Continuations).
  - Veterinary NQF 8
  - Agricultural Scientist

NQF 8

- Agricultural Farm Manager NQF 7 etc

#### Internships

**F**unding for Internships shall only be for learners who require practical exposure in order to obtain a qualification in agriculture.

*Learnerships 18.1 & 18.2 & Nvc - please note that although the application is now, implementation shall only be from 1 april 2018.*

#### Priority Areas

**T**he allocation of funds will be aligned to the AgriSETA strategic objectives with emphasis on the Sector Scarce and Critical Skills. Some of the training interventions that preference will be given to are amongst others, but not limited to, the following occupations/ interventions:

- Farm Equipment/ Machinery Operator
- Landscape Gardener NQF 3
- Forklift Driver NQF 2
- (Please see a list of Scarce and Critical skills on [www.agriseta.co.za](http://www.agriseta.co.za)).

Funding categories - Please click on the relevant learning

programme to download the application form.

### Learnerships

- The value of the Grant per learner for:
  - Employed learners (18.1) R19 292.00
  - Unemployed learners (18.2) R23 108.00
  - Allowance per learner(18.2) R9 624.00
- The number of learners per application should preferably not exceed 15 per application.

### Artsan development

- R50 000.00

### Internships

- R45 000.00

### Bursaries

- R37 500.00 (Under Graduate)
- R60 000.00 (Post Graduate)

### Application guidelines

- Discretionary Grants are made available to employers in support of workplace skills development as well as to unemployed learners in assisting them to gain access to skills development and improve their employment opportunities and/ or to support entrepreneurship.
- Preference will be given to applications that support the Agricultural Sector Scarce and Critical Skills reflected in the AgriSETA Sector Skills Plan (SSP). A comprehensive list of



## leadership training

Scarce and Critical Skills is available on our website under Skills Planning tab.

- Applications should be properly completed and all required supporting documents must be attached. Incomplete applications and the use of wrong application forms will not be considered.
- Applications is viewed as coming from the employer NOT necessarily from the Service Provider.
- Tax Clearance Certificate and the Tax Compliance Status Pin.
- Applications should reach AgriSETA not later than 31 October 2017, 16h30. No late applications will be considered.
- Application forms are available on the AgriSETA website ([www.agriseta.co.za](http://www.agriseta.co.za)) and obtainable by clicking a Learning Programmes indicated in GREEN.
- Past experience has shown that the total value of applications each year, exceeds the available

discretionary funds by far. Stakeholders are therefore encouraged to focus on actual needs when preparing applications. AgriSETA reserves the right to lower the limit depending on the availability of funds.

- At its own discretion, AgriSETA may consider higher NQF levels when approving Learnerships.
- All discretionary grants are VAT zero rated.

**Application period: 01 September 2017 - 31 October 2017**

For further enquiries, please contact Mr Gerard Mamabolo on 012- 301 5607 and all correctly/ properly completed forms should be sent to:

#### **AgriSETA House**

529 Belvedere Road, Arcadia 0083 or email to:

#### **Learnerships (18.1 and 18.2):**

2018-2019LSapplications@[agriseta.co.za](mailto:agriseta.co.za)

#### **New Venture Creation (NVC):**

2018-2019NVCapplications@[agriseta.co.za](mailto:agriseta.co.za).

#### **Artisan Development:**

2018artisanapplications@[agriseta.co.za](mailto:agriseta.co.za).

#### **Bursaries:**

2018bursariesapplications@[agriseta.co.za](mailto:agriseta.co.za).

#### **Internships:**

2018internshipsapplications@[agriseta.co.za](mailto:agriseta.co.za). ■

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# Matrix proteins and EGGSHELL FORMATION

**S**imply increasing shell thickness is not a goal

**E**ggshell quality is of primary concern to the poultry industry. On the one hand, the successful development of a chicken embryo is dependent upon a robust eggshell for mechanical protection, for protection from infection, for prevention of water loss, and as a primary source of calcium for the embryonic skeleton. On the other hand, the commercial

production and marketing of eggs exposes them to insults that cause a high rate of broken or cracked eggshells, which impose major economic losses on the egg producer.

A simple increase in shell thickness is not a satisfactory goal, since shell thickness affects gas and water exchange, and a thicker shell presents a greater obstacle to the emerging embryo. In addition,

the thickness accounts for only a small fraction of the shell's resistance to breakage; therefore other characteristics of the shell should be assessed. In order to improve eggshell quality, it is necessary to identify the molecular constituents involved in the mineralisation of the eggshell.

Biological molecules guide mineralisation processes through a series of specific and definable calcium-biomolecule interactions that lead to the deposition of specific and uniquely oriented crystalline structures. Eggshell assembly and mineralisation are guided by an array of biomolecules that follow a set of biological principles for the mineralisation process. The process of mineralisation in the avian eggshell follows a spatiotemporally defined series of events that correlate to specific regions along the oviduct. Thus, identification of eggshell matrix proteins and their genes, and elucidation of the mechanism and regulation of their synthesis and assembly along the successive segments of the oviduct form a major goal in the process of improving eggshell quality.

### **Eggshell formation**

The eggshell is formed during passage of the egg through the oviduct, with the various layers of the eggshell assembled sequentially as the egg passes through the successive sectors of the oviduct. After fertilisation of the ovum in the infundibulum, and secretion of albumen in the magnum, the egg enters the isthmus 2-3 hours after ovulation. In the isthmus, the granular cells secrete the

various components of the shell membranes, such as collagen type X. Most of the calcium deposition in the eggshell occurs in the shell gland (ESG). Approximately 5-6 g of calcium carbonate is deposited into the chicken eggshell during its formation; most of it during approximately 17 of the 20-hours residence of the egg in the ESG. The rapidity with which this large amount of calcium is deposited makes eggshell mineralisation one of the fastest biomineralisation processes known.

### **Involvement of matrix proteins in mineralisation**

It is widely accepted that the organic matrix components of biologically driven mineralisation play a role in the control of crystallisation. Extracellular matrix proteins of biomineralised structures influence the strength and shape of the final structure of calcium phosphate (apatite) or calcium carbonate (calcite) by modulating crystal nucleation and growth.

Various strategies were used to identify eggshell proteins:

1. Eggshell extraction and protein purification enabled the eggshell proteins of various avian species to be identified and localised to different regions of the shell. For example, ovocleidin 17 was localised to the palisade and mammillary layers, ovalbumin to the mammillary knobs, lysozyme and ovotransferrin, dermatan sulfate proteoglycan is found in the palisade region, keratan sulfate

was extracted from the mammillae, ovocalyxin-32 (OCX-32), which is present at high levels in the uterine fluid during the terminal phase of eggshell formation, was localised predominantly to the outer eggshell, as were ovocleidin-116 and ansocalcin. The ability of some of these proteins to aggregate in solution or induce nucleation of calcite aggregates has been studied.

2. Phosphorylated matrix proteins such as osteopontin (OPN) are believed to play an important role in the process of bone mineralisation. The involvement of OPN in bone calcification was deduced from its tissue distribution, its ability to bind calcium, its localisation to electron-dense regions of mineralisation, and the regulation of its gene expression by calcitrophic hormones such as 1,25(OH)<sub>2</sub>D<sub>3</sub> and parathyroid hormone. In the hen oviduct, OPN gene expression was detected only in the ESG, where massive calcification occurs, and not in any other part of the oviduct. The OPN gene was expressed in a circadian fashion during the daily egg cycle, only during the period of eggshell calcification. No OPN gene expression was detected in the ESG of a pre-laying hen before the onset of reproduction, or after forced removal of the egg close to its→



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entrance into the ESG. The epithelial cells of the ESG, which line the lumen, are the source of OPN and, upon synthesis, OPN is immediately secreted out of these cells and localised in the core of the non-mineralised shell membrane fibres in the base of the mammillae and in the outermost part of the palisade). It was suggested that OPN could be part of the mechanism controlling the eggshell calcification arrest.

3. The recent elucidation of the chicken genome provided an opportunity to explore the matrix proteome of the eggshell biomineral. More than 500 proteins were identified and were divided among a few functional groups. Some of the proteins seem to be unique to the eggshell, some are present in other egg compartments and some are to be found in other tissues as well. Interesting questions emerge, such as the role of lipid-binding proteins in a milieu that is almost devoid of lipids, or the presence of proteins with functions such as apoptosis and angiogenesis in surroundings that lack cells or blood vessels.

### Regulation of the synthesis of eggshell matrix components

The enormous number of proteins found in the eggshell suggests a very complex mechanism of regulation that would be expected to occur in different compartments of the oviduct and at precise time



intervals. The unique circadian fashion of eggshell calcification allowed us to compare ESG gene expression at the time when no egg resides in the ESG and no calcification occurs, with that at the time when the egg resides in the ESG and calcification is at its peak. RNA fingerprinting revealed a set of genes that were differentially induced at the time of calcification. Some of them, such as Na-K-ATPase, are probably responsible for ion transport and establishing the pH required for calcification; the role of others, such as the proteoglycan glypican-4 is still unknown.

During the past few years, the effect of mechanical force on the regulation of cell functions has been extensively studied. Various stresses or strains, such as hydrostatic or hydrodynamic pressure, tensile or biaxial stretching and fluid shear stress have been studied. The applied forces caused a variety of physiological responses such as increased bone resorption, changes in matrix protein synthesis, cell differentiation, changes in smooth muscle contractility and increased cell migration, all of which involved multiple signal transduction pathways.

It was of great interest to discover that the mechanical

strain imposed by the resident egg is coupled to a physiological response and is a major regulator of the expression of genes involved in eggshell calcification. This interpretation was supported by the following observations: the genes are expressed in the ESG only when an egg resides there and imposes a mechanical strain; removal of the mechanical strain caused reduction in the gene expression, and artificial application of a mechanical strain caused their induction to an extent related to the level of the strain.

### Conclusion

The avian eggshell gland is a tissue specialised in the massive calcium transport needed for eggshell formation. Being an extracellular process, eggshell formation is governed by: (i) proteins responsible for biological processes within the tissue, such as calcium transport and establishment of the pH gradient needed for crystal formation; and (ii) proteins that are secreted out, become integrated into the eggshell, regulate the calcification process and become part of the organic shell matrix. At least three interrelated mechanisms regulate the expression of these genes: the mechanical strain imposed locally by the resident egg; circadian rhythm, probably through systemic hormone secretion; and the calcium flux itself. This occurs in a physiological setting on a daily basis. ■

*The article above is an edited extract of a piece authored by M. Pines of the Institute of Animal Sciences, The Volcani Center, Israel. References are available on request.*

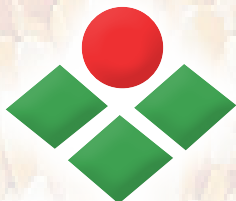


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# A Page IN TIME

The S.A.P.A. Poultry Bulletin - August 1954

Vrystaatse Gedagtes - Deur Dajak



## Te Goed Om Waar Te Wees

In 'n oorsese pluimveeblad het ons kort gelede 'n berig gelees dat die Amerikaanse ondersoekers, Olson en Jennings, daarin geslaag het om deur middel van inspuitings onder die vel, B.W.D. te bestry. Volgens die Bedryfpluimveehouder, waaraan ons hierdie berig ontleen, sou 'n nuwe antibiotikum, nl. Synnematine, 'n besonder goeie inspuitingsmiddel, teen B.W.D. wees en sou alle salmonella pullorum basille na onderhuidse injeksies heeltemal vernietig word. Geen verdere besonderhede oor hierdie toetse en oor die onkoste hieraan verbonde het ons tot dusver onder die oë nie, maar sulke berigte gee 'n mens moed dat ons eenmaal nog op 'n ander manier die gevreesde B.W.D. sal kan bestry as net deur middel van bloettoetse en afslagting. Hoewel ons nie die indruk kry dat steffe onder kuikens as gevolg van B.W.D. nog steeds toeneem nie, bly dit tog maar een van die gevaarlikste siektes waarmee ons te kampe het. En

met belangstelling sien ons uit na verdere berigte oor hierdie proefnemings.

## Versigtigheid Met Antibiotika

Sins die gebruik van antibiotika in ons kuikenmengsels toegelaat word, het reeds heelwat boere proewe hiermee geneem en dit sou nogal interessant wees om rapporte hieroor te kan lees. Persoonlik het ons proefnemings gemaak en dit lyk asof sterfte onder kuikens stellig ietsie minder is, hoewel 'n mens met proewe op gewone plase altyd versigtig moet wees, omdat die geleentheid vir die nodige teentoetse nie altyd aanwesig is nie en dinge soms toegeskryf word aan 'n bepaalde metode of voersisteem, wat eintlik maar net die gevolg van ander omstandighede kan wees. Vanuit die Kaap het ons verneem van proewe wat duidelik bevestig dat die kuikens baie vinniger groei as die A.B. kuikenmeel gebruik word. Die gebruik van A.B. kuikenmeel vir kuikens wat vir slagdoeleindes grootgemaak word kan gelukkig nie veel

kwaad doen nie maar of dit wenslik is om alle kuikens, ook by telers bv. op hierdie meel te voer betwyfel ons tog. In sommige lande is nog strengere beperkings op die gebruik van antibiotika in kuikenmengsels geplaas. Die groot vraag is watter uitwerking die gebruik van antibiotika op die hoenderstapel van die toekoms gaan hê. Op die oog af lyk dit baie mooi om kuikens in hul groeityd teen die nadelige inwerking van allerlei siektekiemte te beskerm, maar die toekoms mag miskien vir ons leer dat hierdie kunsmatige beskerming die natuurlike weerstandsvermoë van die hoenders verswak het. Bowendien mag moontlik met die antibiotika dieselfde gebeur as wat met D.D.T. gebeur het, wat blykbaar op die oomblik nie meer dieselfde dodelike uitwerking op vlieë het as wat in die begin die geval was nie. In so 'n geval mag hoenders met 'n verswakte natuurlike weerstandsvermoë baie makliker die prooi van allerlei siektes word as in die tyd toe die gebruik van antibiotika nog onbekend was. Daarom lyk dit vir ons toe asof, veral telers, versigtig moet wees met die gebruik van antibiotika in hul



kuikenmengsels.

## Rekords Van Broeis Henne

**H**oewel broeisheid maar baie min meer onder die Wit Leghorns aangetref word, bly, veral onder die Australorp henne, die neiging om broeis te word nog taamluk sterk en, hoewel miskeïn in mindere mate, tog ook nog onder die R.I.R. henne maar dit mag as bekend veronderstel word dat die neiging tot broeisheid glad nie beteken dat sulke henne geen goeie produseerders sou wees nie. Ons het by 'n vorige geleentheid al verwys na die lêbatterie wat mnr. Winter van Kroonstad op sy boerdery het.

Begin van die jaar het hy heeltemal willekeurig 13 R.I.R henne wat broeis was in sy lêbatterie geplaas en die gemiddelde produksie oor die 1ste helfte van 1954 dus oor die maande Januarie tot en met Junie 117 eiers. Die produksie van die 5 hoogste produseerders was 148-147-138-136 en 132 eiers. 4 Henne het onder die 100 eiers gelê. Hierdie syfers bewys duidelik

tot watter goeie produksie henne met 'n sterk broeise neiging in staat is, maar tegelyk bewys dit ook die voordeel van lêbatterie vir sulke henne, want nie een van die 13 het in die batterie weer opnuut broeis geword nie. En met sulke goeie lêresultate in die skaars tyd van die jaar behoort hoenderboerdery nog heeltemal betalend te wees.

## Daardie Heffing...

**U**it verskillende berigte en briewe blyk dit baie persone nog nie 'n heeltemal goeie besef het oor die doel van die heffing wat vanjaar as 'n spesiale stabilisasieheffing ingestel is nie. Ook by sommige winkeliers heers nog misverstand en waarskynlik as gevolg van bepaalde persberigte het die gedagte al posgevat dat winkeliers geregtig sou wees om 'n deel van die heffing by hul verkoopprijs te voeg om langs die weg die verbruikers spesiaal vir die heffing te laat betaal. Wat natuurlik glad nie die geval is nie. Net soos by al hierdie soort van heffings het dit weinig nut

om te probeer bereken watter deel van die heffing deur die verbruiker en watter deel deur die produsent betaal word nie. Dit het ook net so min nut om reeds op die oomblik berekenings te maak of hierdie heffing ietsie laer of ietsie hoër moes gewees het. Niemand kan met sekerheid bepaalde voorspellings maak oor die omvang van ons produksie of oor die oorsese pryspeil van eiers nie. Tereg is daarom o.a. in die persverklaring wat kort terug deur die Eierbeheerraad uitgereik is, gewys op die wisselvalligheid van ons uitvoermark en op die noodsaaklikheid van voldoende fondse sodat die oorsese pryspeil nie ontwrigtend op ons binnelandse peil sal inwerk nie.

Daar moet getrag word om die binnelandse mark op 'n nie al laer peil te stabiliseer, watter pryse oorsee ook al mag heers en ten einde die eiermark soveel moontlik onder beheer te hou, het die Beheerraad fondse nodig en hoe sterker die fondse destemêre kans om doeltreffende beheer te kan uitoefen. ■





# Aspiring CHEF

## Devilled Egg Salad

### Ingredients

6 hard boiled eggs  
1 cucumber  
1 large finely  
chopped onion  
4 big tomatoes  
salad leaves  
mayonnaise  
green chillies  
coriander leaves  
salt and pepper to taste.

### Method

1. Boil the eggs and cut them into halves.
2. Remove the yolks.
3. Mash them and mix with mayonnaise, salt, pepper, chopped green chillies and coriander leaves.
4. Replace the yolks with this mixture.
5. Cut the salad leaves, cucumber and tomatoes into very fine slices and decorate in a tray with the eggs.

# It's your BIRTHDAY



According to the SAPA records, the following people are celebrating their birthday during November. We hope that you have a wonderful birthday and many more to come!

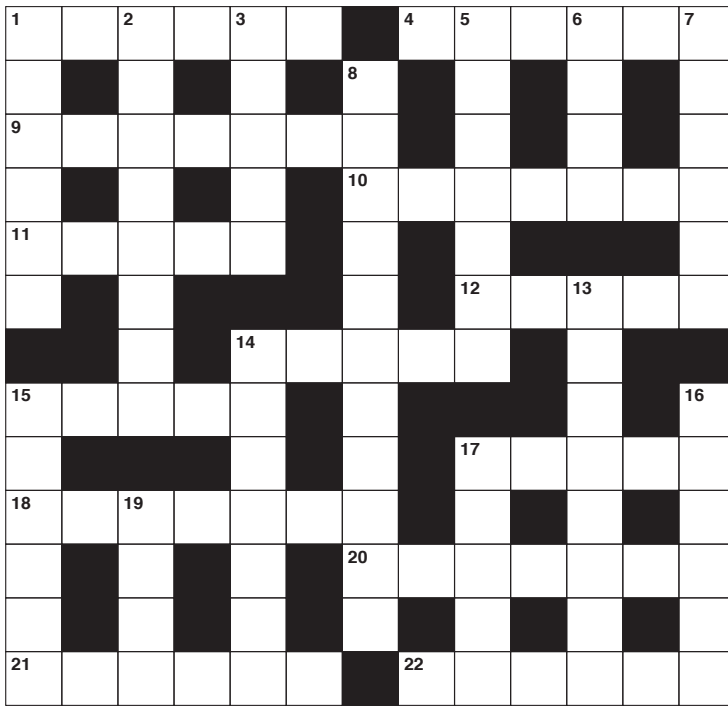
Volgens die SAPV se inligting verjaar al die onderstaande mense in November. Ons hoop dat julle die dag geniet en dat daar nog vele voorlê!

- 1 Mr I M, Goolam, Lenasia Livestock & Poultry cc  
Mr E Du Preez, Sovereign Foods  
Mr W Liebenberg, Crest Choice Chickens Pty Ltd  
Mr T Mkhalifi, Portion 16 Farm  
Mr P Moagi, Bomolemo Chicken Enterprise
- 2 Mr N E Ngcizela, Belesi Poultry Association

- 4 Mr J A Pennel, Pennville Pty Ltd  
Me A Robela, Robela Farming Ent  
Mr E Mtsweni, Sabelosethu Farming  
Me M Botha, Arbor Acres SA Pty Ltd  
Me J Mogodiri, Radisol Group  
Mrs C Mojakhomo, Mojakhomo Broilers  
Mnr T Van Der Merwe, Eggbert Eggs Pty Ltd (Ncome Eggs)
- 5 Mnr F Brown, Elkana Trust  
Mr W P Dintwe



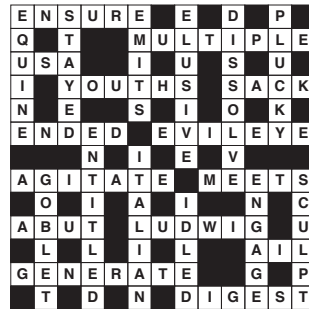
|    |  |    |   |
|----|--|----|---|
|    | Mnr H Oosthuizen, Farmgro Hoenders       |    | Mr M Pillay, New Era Farm               |
|    | Mnr P Pienaar, Highveld Egg Co-Op        | 17 | Mr O V Segano, Segano                   |
| 6  | Mr C Coombes, Sovereign Foods            |    | Me M Wylie, Bergsig                     |
|    | Mnr J Hoeksma, Eldorado Boerdery         | 18 | Me C Hlongwane, Nembua Trading          |
|    | Mr T Strydom, National Chicks a          |    | Mnr G Hugo, Benmalker                   |
|    | Division of Astral Operations Ltd        |    | Me J Swanepoel, Safe Eggs Pty Ltd       |
|    | Mr W Van Biljon, Usuthu Poultry          | 19 | Mnr G H C Coetzer, Tokheim Pluimvee     |
| 7  | Me C K Bodenham, The Chicken on the      | 20 | Mr C Archer, J R 170 Investments        |
|    | run Coop                                 |    | Ms M R Mandlasi, Hitsakile Primary Co-  |
|    | Me P Lesolle, Osmo Group                 |    | Op Ltd                                  |
|    | Mr D Mbambo, National Chicks a           |    | Mr KC Schoeman, Festive                 |
|    | Division of Astral Operations Ltd        |    | Me L Sekhosana, Sedibana Farms          |
|    | Mnr A A Wohlfahrt (Snr), Wohlfahrt       |    | Mr D Watson, Sunspray Food Ingredients  |
|    | Pluimvee Plaas Edms Bpk                  |    | Pty Ltd                                 |
| 8  | Mr W Boshoff, Poorboys Chickens          | 21 | Mr S L Mailula, Pioneer Foods Pty Ltd   |
|    | Mr R K Hlongwane, Land of Trace          |    | Ms L Nxumalo, Ntokozweni Poultry        |
|    | Mnr H P Janse van Vuuren, El-Azaar       |    | Farm                                    |
|    | Poultry Farm cc                          |    | Mrs A Venter, Venter Poultry            |
|    | Me N J Mulaudzi                          | 22 | Mr M Kganetso, Tswana Pride Pty Ltdl    |
|    | Me T Kuhn, Supreme Poultry Pty Ltd       |    | Mnr M J Lourens, Appeldraai             |
|    | Mr G Saal                                |    | Mr K Marshall, Ken Marshall Chicks      |
|    | Mnr B J Van Rensburg, Sovereign Foods    |    | Mr K A Maya, Monzai Eggs                |
| 9  | Mrs J Boshoff, Jeabet Farming            |    | Mr N Potgieter, Supreme Poultry Pty Ltd |
|    | Mr T I Molepo, GDard                     |    | Mafikeng Hatchery                       |
|    | Mr KJ Mphahlele, Kabudi's Poultry        | 23 | Mnr T E Langford, Bergsig Boerdery      |
|    | Ms M Plateel, Morningside Eggs           |    | Mr L Subraminie, National Chicks        |
|    | Mnr H C Prinsloo, Hennie Prinsloo        | 24 | Mr Deleki-Mkona, Dept. of Agric         |
|    | Boerdery                                 |    | Mnr J Laker, Lazena Boerdery            |
| 10 | Mnr B Du Preez, Alzu Ondernemings        |    | Mr A Lewis, Cocorico Farm               |
|    | Mr L L Moselakgomo, Cobb SA              |    | Me F M Mamosebo, Banabamotho TE         |
|    | Mnr J Teessen, Arto Projekte             |    | Mnr G C Schwartzel, J & A Eggs          |
| 11 | Mr L P Buhr, L P Buhr Boerdery           |    | Dr J C Swart, Deltamune Pty Ltd         |
|    | Me U Cilliers, Supreme Poultry Pty Ltd   | 25 | Mr R Barnsley, Toplay                   |
|    | Mr D Lekota, Supreme Poultry Pty Ltd     |    | Mr P C J Clarke, Wilco Van Der Schyff   |
|    | Belgie Breeder                           |    | Boerdery Edms Bpk                       |
|    | Mr M Maweta, Mawetha Investment          |    | Mr R Nyalungi                           |
|    | Me L Tlhoome, Supreme Poultry Pty Ltd    |    | Mr T Teto, Zanenzolo Agric Production & |
|    | Belgie Breeder                           |    | Multipurpose Coop                       |
| 12 | Mr A Kheswa, Dreamland                   | 26 | Mr A Brinkhuis, Chamomile Farming       |
|    | Mr E M Mkhonto, Kersh Investments CC     |    | Mnr B D C Gerber, Epoch Pluimveeplaas   |
| 13 | Mr J Lambinon, Safe Eggs Pty Ltd         |    | Mr A Masilela, Portion 16 Farm          |
|    | Mrs K Makumbela, Tinyiko Poultry         |    | Me N F Mbalo, Simba Mabhele Farm cc     |
|    | Producers                                |    | Mr H Roos, Agricontra                   |
|    | Mrs A Mapanyane, Mapanyane Layer         | 27 | Mnr AJ Jenkinson, Eggolegg Pty Ltd      |
|    | Project                                  |    | Prof N Maiwashe, Agric Research Council |
|    | Mnr G Van Zyl, Spif Chickens             | 28 | Mr M G Phalo, Bloemspruit Chicken       |
| 14 | Mnr F Ferucci, Rosendal Poultry Farm     |    | Palace                                  |
|    | Mr F Jacobsz, Supreme Poultry Pty Ltd    |    | Mr R A Schruer, Valley View Poultry     |
| 15 | Mr D J Irvine, Irvines Zimbabwe Pvt Ltd  |    | Mr P Spencer, Arrabon Farm              |
|    | Mr J Searle, Supreme Poultry Pty Ltd     | 30 | Mr M Hamilton-Hall, Zonderzorg          |
|    | Potchefstroom                            |    | Investment cc                           |
|    | Mr M Van Wyk, Supreme Poultry Pty Ltd    |    | Mnr I Kruger, I S Kruger Boerdery       |
| 16 | Mr J Burgoyne, Ross Poultry              |    | Mnr P Serfontein, City Square Trading   |
|    | Mr J Du Plessis, Kiepersol Pluimveeplaas |    | T/A Boskop Layer Chickens               |



### Across

- 1 With the mouth wide open (6)
- 4 Person attacked (6)
- 9 Derived by logic without observed facts (1,6)
- 10 Ending (7)
- 11 Brains (5)
- 12 More recent (5)
- 14 Despised (5)
- 15 Courageous (5)
- 17 Final letter of Greek alphabet (5)
- 18 Starchy root vegetable (7)
- 20 Destructive (7)
- 21 Buying something with money (6)
- 22 Of practical benefit (6)

Take a  
BREAK



Last issue's answers

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| 4 | 5 | 8 | 2 | 7 | 1 | 6 | 9 | 3 |
| 7 | 2 | 9 | 4 | 3 | 6 | 8 | 1 | 5 |
| 1 | 3 | 6 | 9 | 5 | 8 | 4 | 7 | 2 |
| 6 | 8 | 1 | 3 | 2 | 5 | 7 | 4 | 9 |
| 9 | 7 | 3 | 1 | 6 | 4 | 5 | 2 | 8 |
| 5 | 4 | 2 | 7 | 8 | 9 | 1 | 3 | 6 |
| 2 | 6 | 7 | 5 | 4 | 3 | 9 | 8 | 1 |
| 8 | 9 | 4 | 6 | 1 | 2 | 3 | 5 | 7 |
| 3 | 1 | 5 | 8 | 9 | 7 | 2 | 6 | 4 |

### Down

- 1 Music industry award (6)
- 2 Baseless distrust of others (8)
- 3 Crevices (5)
- 5 Take possession of; lock up (7)
- 6 Skirt worn by ballerinas (4)
- 7 Shooting star (6)
- 8 200th anniversary (11)
- 13 Mythical creature (8)
- 14 Six sided shape (7)
- 15 Substitute kept in reserve (4,2)
- 16 Ornamental knotted rope (6)
- 17 Misses out (5)
- 19 Linger (4)

|          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>2</b> |          |          |          |          |          |          |          | <b>3</b> |
|          |          |          | <b>4</b> | <b>2</b> | <b>1</b> |          |          | <b>5</b> |
|          | <b>7</b> |          |          | <b>5</b> | <b>6</b> |          |          | <b>4</b> |
|          | <b>5</b> |          |          | <b>3</b> |          |          | <b>4</b> |          |
|          | <b>3</b> | <b>2</b> | <b>9</b> |          | <b>7</b> | <b>5</b> | <b>1</b> |          |
|          | <b>6</b> |          |          | <b>1</b> |          |          | <b>2</b> |          |
| <b>4</b> |          |          | <b>5</b> | <b>9</b> |          |          | <b>8</b> |          |
| <b>5</b> |          |          | <b>1</b> | <b>7</b> | <b>8</b> |          |          |          |
| <b>3</b> |          |          |          |          |          |          |          | <b>1</b> |

# Innovation by experience.



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