

UPCOMING EVENTS

- 9TH WORLD CONGRESS ON CONSERVATION AGRICULTURE: 22-25 JULY 2024
- HERKOUERDAG OVERBERG AGRI (ROODEBLOEM): 15 AUGUST 2024
- SSK WINTER CEREAL DAY RIVERSDALE: 21 AUGUST 2024
- SKOG FARMERS' DAY: 29 AUGUST 2024
- PLAASPERSONEELDAG (ROODEBLOEM): 25 SEPTEMBER 2024
- BOERDAG ROODEBLOEM: 26 SEPTEMBER 2024



MARCH/APRIL 2024

BLWK/nuusbrieff CAWC/newsletter

Inhoud/Contents

LINKS OF THE MONTH	2
PERSPECTIVE ON SCIENTIFIC TRUTH VERSUS SCIENTIFIC EVIDENCE; MAINTAINING INTEGRITY IN GLOBAL FOOD SYSTEMS	4
CALLING ALL GRAIN & VEGETABLE PRODUCERS FARM MANAGEMENT PRACTICES JOIN OUR FARM MANAGEMENT PRACTICES SURVEY	15
IHSD FOR CASE IH BROCHURE	17
PROGRAMME 9WCCA - APRIL 2024	31

VOORWOORD/PREFACE

Hallo almal

Ons is midde in die 2024 plant sesioen. Met die afry Riversdal toe om die proewe daar te gaan vestig was daar al een of twee canola lande al mooi gevestig. Ons hoop en vertrou dat 2024 'n normale seisoen sal wees.

Die voorbereidings vir die 9de Bewaringslandbou Wêreld Kongres vorder baie goed. Die program is volgepak met interessante hoof sprekers, paneelbesprekings en 93 ander kort boere en navorsing praatjies van regoor die aardbol. Dit belooft om n baie interessante 4 dae te wees.

Die voorlopige program is beskikbaar in die nuusbrieff.

Mag julle 'n produktiewe en geseënde 2024 beleef.

Groete van huis tot huis.

Hello everyone

Planting season is in full swing, and driving down to Riversdale to plant the trial site, one could see one or two established canola fields. We hope for a normal season after the wet 2023.

The preparations for the highly anticipated 9th World Conservation Agriculture Conference are going well. This event, filled with interesting keynote speeches, panel discussions, and 93 other oral presentations from farmers and researchers from across the globe, is a unique opportunity for us all to learn, share, and grow together.

You can find a preliminary programme inside the newsletter.

May all of you experience a productive and blessed 2024.

All the best!

Prof Johann Strauss

Redakteur/Editor

LINKS OF THE MONTH

02

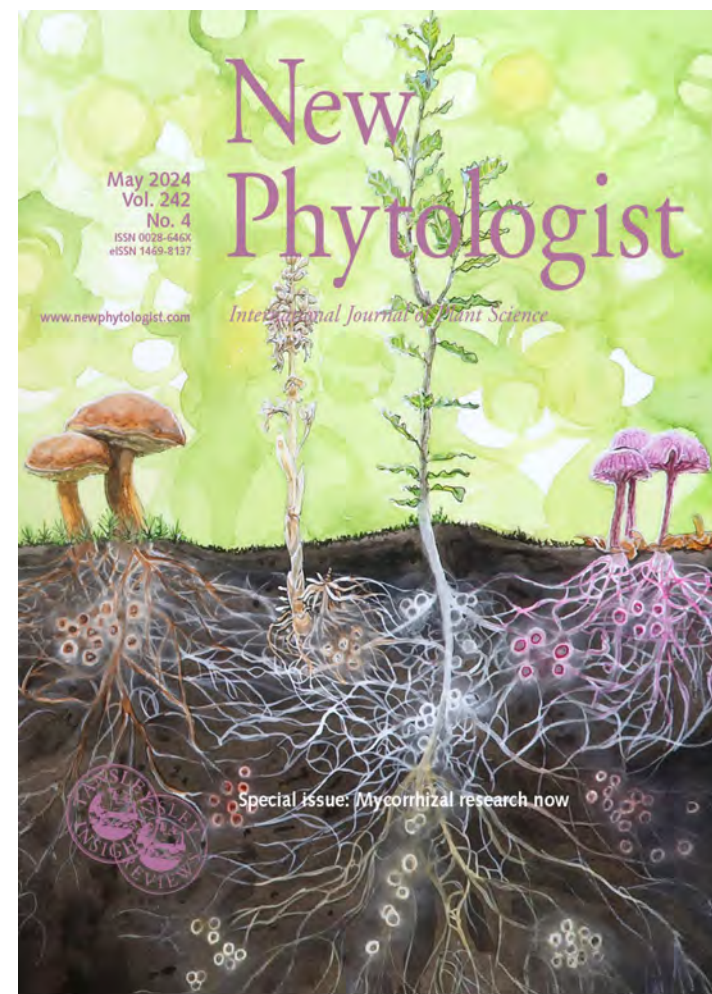
CLICK ON THE BUTTON TO VISIT THE WEBSITE. PLEASE NOTE YOU WILL NEED AN INTERNET CONNECTION.



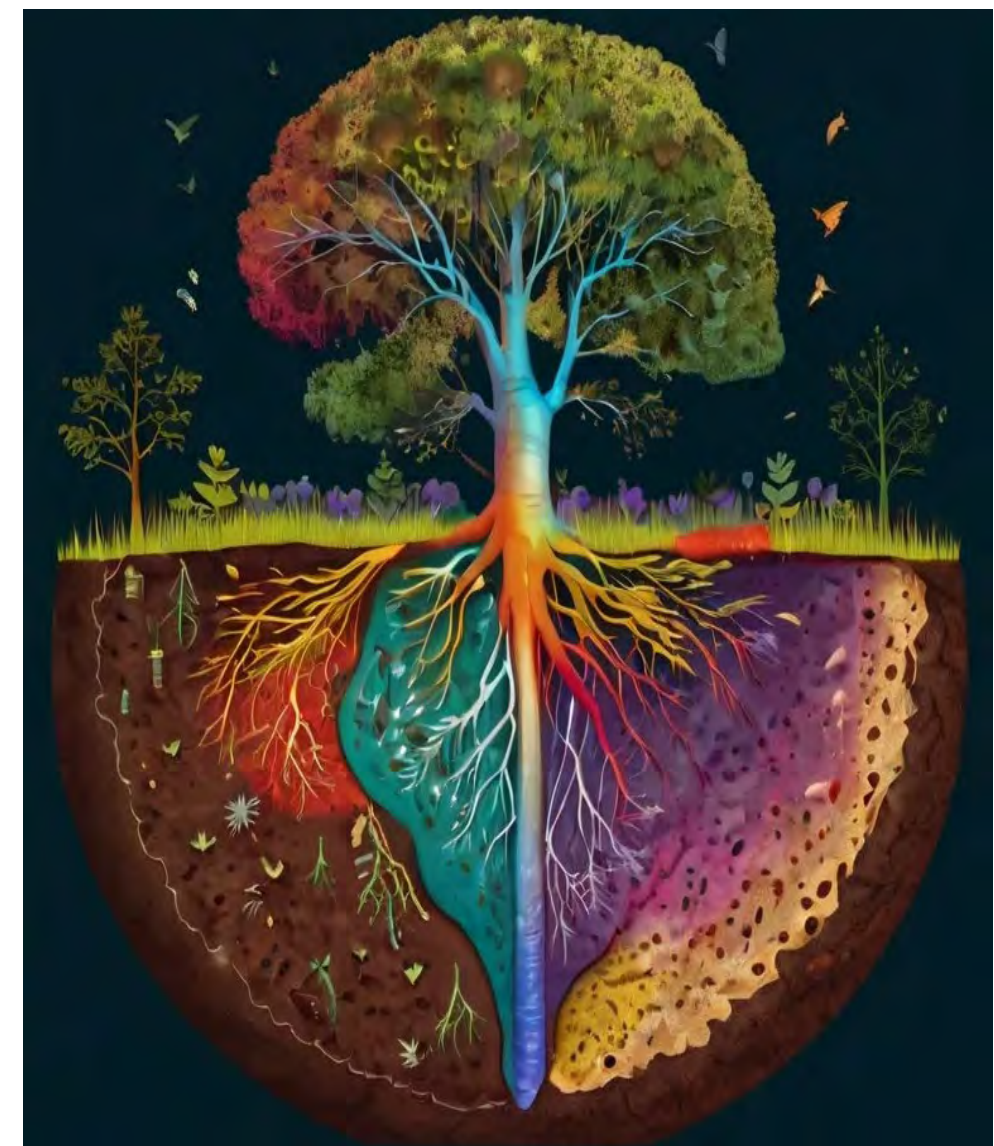
Scientists discover first nitrogen-fixing organelle



Distinct soil health indicators are associated with variation in maize yield and tile drain nitrate losses



Mycorrhizal research now



Soils, soil microbiome and 'mechanistic understanding'

Perspective on scientific truth versus scientific evidence; maintaining integrity in global food systems

Peer Ederer^{A,*} 

For full list of author affiliations and declarations see end of paper

*Correspondence to:

Peer Ederer
GOALSciences at Global Food and
Agribusiness Network, Rapperswil,
Switzerland
Email: peer.ederer@goalsciences.org

Handling Editor:

Frank Dunshea

ABSTRACT

Sciences related to animal agriculture are threatened by agenda-driven scientists. It can be shown that too many peer-reviewed articles have dubious quality, including high-profile ones. Better training and higher review standards for rigour, reproducibility and transparency should help alleviate the problem. However, they will not solve the challenge posed by 'cargo cult scientists', as characterised by Richard Feynman. Such agenda-driven scientists pursue an *a priori* mission, whose achievement justifies any means, even if it includes to willfully manipulate and interpretate data, or to violate good practices of integrity in the sciences. This review explores in three prominent case studies in animal-sourced food related sciences where the dividing line might be between science being poorly practiced (which can be remedied), and scientific channels being abused for agendas (which should not be tolerated). So as to guard both as the individual scientist and as the discipline against the intrusion of such agenda-driven science, this article suggests adopting the Popperian stance to generally refrain from the concept of seeking or establishing a 'scientific truth', and instead to restrict oneself to presenting the 'scientific evidence', both in terms of what the evidence shows, and what it does not.

Keywords: animal agriculture, cargo cult scientist, conflict of interest, food systems, integrity, reproducibility and transparency, rigour, scientific evidence, scientific truth, white-hat bias.

Introduction

Scientific research integrity is the cornerstone of sustainable global food systems. Across scientific-research disciplines, there is a growing attention on uplifting standards of scientific research and publication. The aim is to bolster credibility and standing of science in society, where science is seen to be both the victim and the perpetrator of a post-truth era. Systematic examinations of published research results have repeatedly shown outright false, severely biased or irreproducible findings (Brainard and Jia 2018). Retraction Watch estimates that one in 50 papers would meet the criteria for retraction (Oransky 2022). In a paper that has been viewed 3 million times and cited more than 7000 times, Ioannidis (2005) laid out a proof, how most published research findings are false according to him. In a 2016 paper, Ioannidis (2016) lamented in the abstract about 'the mass production of redundant, misleading and conflicted systematic reviews and meta-analyses [. . . of which . . .] few are both non-misleading and useful.' So as to improve scientific quality, editorial boards of scientific journals (for instance, McNutt 2014, Editor-in-Chief of Science, or Horton 2015, Editor-in-Chief of *The Lancet*), research-funding institutions (for instance, National Institutes of Health, NIH 2023) and universities (for instance, Indiana University, Valdez *et al.* 2020) require from scientists increasingly higher proofs of rigour, reproducibility and transparency (RRT) standards before their work can be conducted, financed or published. This general state of science appears to apply to the animal-related sciences as well. For instance, a meta-analysis of 3.62 million publications in 25 different disciplines showed that the prevalence of selectively presented statistics (and therefore potentially false) in animal-related sciences, such as nutrition and dietetics, animal and agricultural, ecology and earth, zoology or public health, is largely equal to, or worse than the average in the other disciplines (Cremieux 2023). Instead, when correctly done, quantification

P. Ederer

Animal Production Science 64 (2024) AN23331

ensures advances in the nutritional sciences, agriculture, animal production and agronomy. Correctly executed quantitative evaluation of evidence is the core strength of the scientific approach used by these disciplines and has been responsible for major gains in food production efficiency over the past century (Pethick *et al.* 2023).

Research is being conducted into why researchers may not be following high RRT standards. Reasons are, for instance, pressure to publish, lack of funding, lack of training in scientific methods, peer-review pressure to acknowledge legacy findings and similar (Anderson *et al.* 2007; Valdez *et al.* 2020). Other researchers systematically outline reasons for why it is difficult to retract and correct published results (Allison *et al.* 2016). To clarify the standards for reproducibility and replicability in the sciences, the US National Academies of Sciences, Engineering and Medicine (NAS) felt compelled to publish a far-reaching Consensus Study Report in 2019 (National Academies of Sciences, Engineering, and Medicine 2019). An article in *Plato* illuminated the many different expressions and origins for missing reproducibility (Plato 2018). In 2014, *The Lancet* launched a five-part series on improved research design called 'Increasing Value, Reducing Waste' (The Lancet 2014).

This article advances the proposal, that while improving the standards of RRT is much welcomed, by itself it will not resolve all problems of poor science. Epistemology has long been struggling with a more basic conflict, namely requests by society for science to be relevant by producing truths. This request unfolds a dynamic that can lead to four types of poor science, which I will respectively call 'sloppy, biased, opportunistic and agenda-driven' science; it is the last one that threatens the integrity of science the most. Following epistemological considerations, this article investigates, in three case studies, specifically within the domain of animal-related sciences, how societal interference may be leading science away from objectivity and discovery towards confirmation of agenda-determined outcomes. The selection of these case studies represents three of the highest-profile science/global public-policy interactions between the years 2015 and 2021 on the question of the healthiness of meat consumption. While recognising the limitations of case studies, given the prominence and significance for global public policy of the three cases here presented, they can be seen as paradigmatic indicators of a wider-spread phenomenon (Flyvbjerg 2006). I will end with the observation that to guard both the practitioners and the users of science against loss of integrity, it is advisable to delete the concept of 'scientific truth' from the mental toolkit.

Epistemological considerations

In a high-profile OECD/European Union conference called 'Governing better through evidence-informed policy making' (OECD 2017), it was observed that 'evidence is necessary to

fight against a post-fact/fake news world', and that 'scientific evidence competes with values, feelings, and emotions of politicians and constituents, and that good evidence is only one element in political decision making.' To be useful to policy, scientists should be 'building compelling narratives . . . be concise and use simple language', while at the same time 'be clear and give a detailed understanding'. To paraphrase, this sort of 'speaking truth to power' which the OECD/EU workshop is advocating for, is a sociological construct of 'a belief that scientists, unimpeded by economic self-interest or partisan bias, will deliver honest and often uncomfortable truths to those in positions of power' (<https://sociology.iresearchnet.com/sociology-of-science/speaking-truth-to-power/>). The origins of such 'speaking truth to power' are rooted in the 1950s in the US American Civil Rights movement, and have since evolved to describe the essence of 'good and pure' science (and journalism for that matter), not the least through the work of Robert K. Merton, namesake for the 'Mertonian norms.'

There are at least two problems with this ideal. First, it ignores that 'the truth' is a controversial concept on its own. In various social-science disciplines, prominently in philosophy, sociology and political science, researchers are debating what truth is, what truth means, and how relevant truth is. Respective theories on the nature of truth are, for instance, called correspondence, coherence or pragmatic and more. This debate shall not be repeated here (for some recent philosophy essays on truth in science, see Massimi 2019 or Brüssow 2022). In short, the problem with truth, from an epistemological point of view, is that it is indivisible. There cannot be several different truths about the same thing, and thus if a truth was ever found, it would end further scientific inquiry into the matter, which, as history has shown often enough, is usually premature. The second major problem, which may be even more important, is that not only does truth speak to power, but power also speaks to truth. The permeability of science to the values it is competing with in the societal discourse is well understood (for instance, Silva 2014). Robert Hoppe observed in 1999 that 'increasing scientification of politics leads to a politicisation of science' (in abstract). Similar is occurring in animal-related sciences. Blaxter and Webster (1991) is worth quoting here in full, as follows: 'The examples I have given of the increasing use of incomplete or selected information, or the acceptance of views given on the basis of limited and inconclusive scientific data, or the ignoring of informed advice altogether, in formulating public policy, is extremely worrying. In the years to come I am of the opinion that policies will be adumbrated by various pressure groups on the basis of little evidence, pursued assiduously by them, and eventually accepted on the basis that, although not scientifically defensible, they have become politically expedient' (p. 268, concluding paragraph).

The challenge is as old as science itself, with the starting line in history generally considered being Aristoteles. Before

Received: 3 October 2023

Accepted: 26 March 2024

Published: 22 April 2024

Cite this:

Ederer P (2024)
Perspective on scientific truth versus
scientific evidence; maintaining integrity in
global food systems. *Animal Production
Science* 64, AN23331. doi:10.1071/AN23331

© 2024 The Author(s) (or their

employer(s)). Published by

CSIRO Publishing.

This is an open access article distributed

under the Creative Commons Attribution-

NonCommercial-NoDerivatives 4.0

International License (CC BY-NC-ND).

OPEN ACCESS

Aristoteles, Socrates created synthetic truths in his famous dialectic approach, which is ultimately an induction, a generalisation from the particular to the universal. But then his student Aristoteles instead emphasised deductive logic, such that a universal theory can be tested for its correctness in the particular and holds provisionally right only until a particular has been found that disproves it. The theory that all swans are white is only provisionally correct until a black swan is found. The practical result of Aristotelean logic is that science can establish with certainty only what is not. In the 20th century, Karl Popper expanded this falsification paradigm. In his essay 'Knowledge without authority' Popper is adamant that the only useful pursuit of science is to engage in falsification exercises and that theories that do not have falsification options are useless. 'There is no criterion for truth at our disposal... but we possess criteria which, if we are lucky, may allow us to recognise error and falsity.' (Popper 1960, p. 55).

The aforementioned NAS Consensus Report 2019 signposted in its table of contents that 'science aims for refined degrees of confidence, rather than complete certainty.' It further stated that 'the robustness of science is... represented by a more holistic web of knowledge reinforced through multiple lines of examination and inquiry' (National Academies of Sciences, Engineering, and Medicine 2019, p. 143) and then finished with the recommendation that 'scientists should take care to avoid overstating the implications of their research and also exercise in their review of press releases...' (National Academies of Sciences, Engineering, and Medicine 2019, p. 160). With these views, NAS positioned itself firmly on an epistemology as expressed by Popper. While the study of Popperian epistemology is a common staple for scientists-in-training of any social and natural discipline, strict adherence to its application is less popular. In the tradition of Karl Popper's epistemology, this article suggests, that when a subject is as politically contested and fought over by societal stakeholders as the fields of the animal-related sciences are, then the safest course for integrity science is to stay close to Popper, that is, to aim to prove what is not true and accept that an insight will only be transiently applicable.

Four categories of poor science

1. *Sloppy science.* A spread sheet on a laptop today has more options to compute statistics than a super computer had in the 1960s. Statistics packages such as the widely used SPSS are even more powerful. But the corresponding art of rigorous analytical design has diffused much slower. Access to computing power had already outstripped knowledge of statistics among scientists by the 1970s, prompting David Sackett to publish his canonical catalogue of 35 different kinds of technical flaw in 'analytical studies' (Sackett 1979). He noticed an 'ebullition of case-control studies in progress' (p. 51), and felt the need to enlighten researchers of all the different ways in which

hapless study and analytics design will inadvertently slant the results and diminish the value of the research. Unaware researchers would not even know about the faults in their analysis, unless they specifically checked and tested for these flaws. As outlined in the introduction, rising emphasis on rigour to avoid false scientific findings due to sloppiness is welcome and can only but improve the quality of science.

2. *Biased science.* However, these RRT technical training efforts will not capture all cases. A second kind of poor science was described by Cope and Allison as so-called white-hat bias (WHB), exemplary for in the field of obesity research (Cope and Allison 2010). Cope and Allison defined it as 'bias leading to distortion of research-based information in the service of what may be perceived as righteous ends' (in abstract). Under WHB, the researcher might be perfectly technically capable of correct study design but is prone (almost) subconsciously to selective bending of the data to make it meet a pre-specified target. Nonetheless, a bias is not intent, but something that one is not fully aware of. Biased results owing to such WHB are a false outcome for science, and should be rectified when the bias is discovered, but they are not intentionally wrong. Ultimately, rigorous peer review and a ready willingness of journals to retract articles can counteract WHB.
3. *Opportunistic science.* A third kind of poor science production that goes beyond RRT and WHB, is intentional manipulation of the scientific method and then to obfuscate the manipulation behind intelligent-looking gobbledygook for reasons of financial or career gain. One increasingly common way to address the risk of such intentional manipulation occurring is through the process of declarations of conflicts of interest (COI), especially financial ones. The assumption in this approach is, that a declared actual or potential financial COI would expose incentives to compromise the practice of scientific method and thus caution the user of such results to its potential falsity. Whether or not the COI approach solves the problem is much contested (Fisch 2018; John *et al.* 2019). Moreover, beyond financial COI, there may also be career-interest conflicts, network-based conflicts and ideological conflicts (Bero and Grundy 2018). In animal-related sciences, it has become increasingly common to declare one's dietary habits in conference presentations and publications (vegan, vegetarian, pescatarian, omnivore, etc.), on the presumption that such dietary preferences may be clouding one's ability to conduct science objectively.
4. *Agenda-driven science.* It is this fourth kind of false science, which is the most threatening, which is when scientists feel that it is their right and duty to manipulate the scientific evidence with intent, so as to pursue an agenda they believe in. They are neither poorly trained, nor biased, nor interested, they are zealous. For them, fitting the evidence towards an end, is to make the right

goal justify the means. Neither RRT training, nor peer review nor any degree of COI disclosure will capture these cases. The existence of such malpractice is well established, although the extent of it is not.

Richard Feynman in his famous 1974 Caltech commencement address, coined this term 'cargo cult science' (Feynman 1974), as follows: 'In the South Seas there is a cargo cult of people. During the war they saw airplanes land with lots of good materials, and they want the same thing to happen now. So they've arranged to make things like runways, to put fires along the sides of the runways, to make a wooden hut for a man to sit in, with two wooden pieces on his head like headphones and bars of bamboo sticking out like antennas – he's the controller – and they wait for the airplanes to land. They're doing everything right. The form is perfect. It looks exactly the way it looked before. But it doesn't work. No airplanes land. So I call these things cargo cult science, because they follow all the apparent precepts and forms of scientific investigation, but they're missing something essential, because the planes don't land.'

Agenda-driven scientists are cargo cult scientists. They appear to be practicing the scientific method, by engaging in data analysis, drawing conclusions, publishing results, peer-reviewing themselves, disclosing potential conflicts of interest and teaching students. Despite practicing in this form, they achieve no good progress, neither for themselves, nor for society but the agenda they promulgate. Their airplanes do not land. Feynman (1974) suggested that the problem is not only a lack of understanding of how the form of these scientific behaviours operates to produce progress for society. He spells out that the deeper reason why cargo cult science ultimately does not work is because it lacks integrity. His parting wish to the graduates was as follows: 'the good luck to be somewhere where you are free to maintain the kind of integrity I have described, and where you do not feel forced by a need to maintain your position in the organization, or financial support, or so on, to lose your integrity. May you have that freedom.'

Three case studies where science may have or be about to lose its integrity

The following three case studies serve to examine where there might be the dividing lines among these four types of poor science leading to false outcomes.

The IARC Working Group report on the Carcinogenicity of Red Meat

The first case study is the IARC (International Agency for Research on Cancer, a suborganisation to the World Health Organisation WHO) Working Group report on 'Carcinogenicity of consumption of red and processed meat', which was

published on 26 October 2015 in *The Lancet*. The IARC group consisted of 22 members from 10 countries. According to both the press release by WHO, with a four-page question and answer (Q&A) session on its website, as well as a short article in *The Lancet* (Bouvard *et al.* 2015), the group had 'assessed more than 800 epidemiological studies...', and, on this basis 'classified consumption of red meat as probably carcinogenic to humans (Group 2 'classified consumption of red meat as probably carcinogenic to humans (Group 2A)' and processed meat as 'carcinogenic to humans (Group 1)'. Three years later, the extensive documentation was published as a monograph (IARC 2018). At the time of writing this perspective (July 2023), according to PlumX metrics, the *Lancet* article has been cited 1190 times, and was used 81 times in public-policy documents, including several times in United Nations global-policy documents. During the second quarter of 2023 alone, the *Lancet* article was quoted 51 times and used 12 times in public-policy documents. While the IARC evaluation is already 8 years old, it is still prevalently used and cited.

In the *Lancet* article, the IARC group members briefly summarised the balance of their evidence on which they base their evaluation. For instance, they wrote in the eighth paragraph that 'Chance, bias, and confounding could not be ruled out with the same degree of confidence for the data on red meat consumption, since no clear association was seen in several of the high-quality studies and residual confounding from other diet and lifestyle risk is difficult to exclude. The Working Group concluded that there is limited evidence in human beings for the carcinogenicity of the consumption of red meat.' Two paragraphs later the authors then went on to explain 'the mechanistic evidence for carcinogenicity was assessed as strong for red meat' (they mentioned N-nitroso compounds (NOC), haem iron and hormonally active agents (HAA)), which was then qualified by the WHO Q&A 11th answer, namely that 'Eating red meat has not yet been established as a cause of cancer.'. As the only quantifying piece of information, the text mentions 'A meta-analysis of colorectal cancer in ten cohort studies reported a statistically significant dose-response relationship, with a 17% increased risk (95% CI 1.05–1.31) per 100 g per day of red meat and an 18% increase (95% CI 1.10–1.28) per 50 g per day of processed meat.'. The *Lancet* article concluded that for its carcinogenicity evaluation, the 'Working Group took into consideration all the relevant data, including the substantial epidemiological data... and the strong mechanistic evidence.'. The authors did not explain how 'no clear... limited evidence' in the statistical associations become 'substantial epidemiological data', nor how 'strong mechanistic evidence' squares with 'no establishment of causality'. The contradictions between their own few paragraphs of text and their conclusion to identify red meat as probably carcinogenic were left for the reader to resolve. The same can be said for the separate evaluation of processed meats.

The methodological weaknesses of the IARC evaluation have since been variously described and published. A comprehensive critique came from Klurfeld (2018), who was himself member of that IARC Working Group. He explained the statistical inadequacy of using relative risks of less than 200% for casting any judgement, let alone just 17% as used by IARC. For instance, relative risk of lung cancer from smoking cigarettes would be 1000–3000% (p. 6). He also explains the difference between relative risk and absolute risk, where if values of 17% are applied to what are low incidence rates such as specific cancers, then the resulting increased absolute risk is outside fair measurability, or indeed significance for the consumer. Furthermore, to illustrate the inadequacy of statistical associations due to confounding factors for making such far reaching evaluations, Klurfeld (2018) also quoted one of his own previous analyses showing that red meat eaters have a statistically robust higher relative risk of 28% over white meat eaters of dying in accidents (p. 8). Surely, however, red meat consumption does not cause more accident deaths. Whatever association red meat may have with mortality or chronic disease, it is small and contextual, thereby depending on inter-individual differences and vulnerabilities, dose, preparation methods, quality of background diets, and overall lifestyles (Johnston *et al.* 2023). Regarding the mechanistic evidence, Kruger and Zhou (2018) showed in a review of all available material that studies of NOCs and haems 'have not provided sufficient documentation that the mechanisms studied would contribute to an increased risk'. Boobis *et al.* (2016) thoroughly explained that the whole methodology of hazard identification utilised in the IARC monograph series generally 'have become outmoded and serve neither science nor society' (title). Also in 2016, the Editorial of *The Lancet Oncology* equally called for an improved methodology for carcinogen assessment, as the current one could be flawed (The Lancet Oncology 2016).

The balance of the epidemiological evidence on meat consumption was also comprehensively questioned by the NutriRECS consortium evaluation from the year 2019, which concluded after reviewing each available epidemiological study, that there is 'only low to very-low certainty evidence' for any mortality risk, and that therefore adults might 'continue current unprocessed red meat consumption.' (Johnston *et al.* 2019, abstract). A publication in *Nature Medicine* in October 2022, reviewing the same evidence again, arrived also at essentially the same conclusion, that 'while there is some evidence that eating red meat increases risk of chronic disease, it is weak and insufficient to make stronger or more conclusive recommendations.' (Lescinsky *et al.* 2022, abstract). Moreover, in 2021, the Scientific Council of the World Farmers Organisation released a review (WFO 2021, the author of this article was also one of the co-authors of this WFO review), where it was demonstrated that the IARC statement of '17% increased risk per 100 g per day of red meat' can be attributed primarily to just one study conducted in 2005, and that the data

in that study was significant only for pork meat, and only after statistical enhancement, according to IARC's own assessment.

Overall, it can be concluded, that the 2015 IARC evaluation has been discredited along every dimension. It has been shown methodologically, epidemiologically and mechanistically to be devoid of supporting scientific evidence. It does not meet the before-mentioned National Academies of Sciences, Engineering, and Medicine (2019) robustness standard of being a 'holistic web of knowledge reinforced through multiple lines of examination'. Given the very high-profile public-policy significance of this document, why has this IARC evaluation not been retracted or been reassessed, given all of the substantial counter-evidence described above? It seems also fair to ask, on what basis did the 22 IARC Working Group members reach their evaluation to begin with, if there was such degree of insufficient scientific evidence as shown by their own documentation? Is it possible that they followed an agenda they established beforehand, for which scientific evidence is helpful, but not mandatory?

The Global Burden of Disease 2019 investigations

The second case study concerns the Global Burden of Disease (GBD) 2019 study. When it was published, some observers (concerned scientists) noticed a conspicuous jump of dietary risks and deaths associated with diets high in red meat, compared with the previous GBD 2017. There was a 36-fold increase to a total of 896,000 deaths (GBD 2019 2020). Deeper analysis of the publication showed that the theoretical minimum-risk exposure level (TMREL) was reduced to 0 g per day, making red meat toxic from the first bite. Additionally, it seemed that none of the well-established protective health effects were assigned. Underlying evidence for such a strong statement seemed to be lacking in the documentation. Furthermore, against the stated guidelines of *The Lancet*, no PRISMA (www.prisma-statement.org) or GATHER (<https://www.who.int/data/gather/statement>) statements could be found, both of them being instruments in health-related sciences to ensure that the necessary minimum of information is provided for independent review.

The observers eventually succeeded to publish a letter in *The Lancet* in April 2022, asking whether the estimate of deaths attributable to red meat intake in GBD 2019 is reliable (Stanton *et al.* 2022). In the authors' reply, the GBD collaborators then admitted that the setting of TMREL to zero was methodologically not adequate and will be revised for GBD 2020 (Murray 2022). Furthermore, the main author Christopher Murray has separately confirmed that GBD 2019 is not PRISMA-compliant (A. Stanton, as per an email conversation received from C. Murray, 2023). The observers note that according to the guidelines of *The Lancet* and the Committee on Publication Ethics (COPE) and the International Committee of Medical Journal Editors (ICMJE), it is mandatory to immediately correct all such known errors. This has so far not been the case, while at the same time GBD 2019 keeps

on being referenced in important public-policy documents such as the Europe's Beating Cancer Plan of the European Union. In a further letter to *The Lancet*, another group of observers are much concerned about the 'troubling assumptions behind GBD 2019 on the health risk of red meat' (Gordon-Dseagu *et al.* 2022, title). Finally, Christopher Murray was himself the senior last name author for the above-cited *Nature Medicine* publication in October 2022 arriving at the conclusion that the evidence against unprocessed red meat '...is weak and insufficient to make stronger or more conclusive recommendations' (Lescinsky *et al.* 2022).

Similarly, to the IARC study of 2015, the next steps are still outstanding. Scientific protocol, guidance and rules unequivocally demand a retraction and correction of such medically relevant key stone publications, if they have been found to be erroneous. Why is GBD 2019 still unretracted? How is it possible that a GBD evaluation can reach results with such far-reaching implications for global public policy, if there was insufficient scientific evidence as Murray stated himself?

Sustainable livestock at United Nations Food Systems Summit 2021

The third case study pertains to global public-policy proceedings at the United Nations Food Systems Summit (UNFSS) in 2021, which were supposed to be underpinned by science. In the Summer of 2019, United Nations Secretary General Antonio Guterres announced he would convene a Food Systems Summit as part of the Decade of Action to achieve the Sustainable Development Goals (SDGs) by 2030, as follows: 'The Summit will launch bold new actions to deliver progress on all 17 SDGs, each of which relies to some degree on healthier, more sustainable and equitable food systems.' (UN 2019). The initiative became delayed by the outbreak of the pandemic, and it is not publicly known how the leadership structures of the Summit proceedings were chosen. By November 2020, the Summit preparations *de facto* kicked off in a large symposium of panels, discussions and presentations called 'Bold Actions for Food as a Force for Good' (all online because of the pandemic). It was hosted on an online platform provided by World Economic Forum and could be attended only by becoming a paying member of the World Economic Forum. This event was important because, for the first time, the organisation of the Summit proceedings was made comprehensively public, with its five action tracks, their staffing and agendas. The November 2020 event had the following as its first objective: 'to agree on an initial set of bold actions and science-based principles to change the food system' (UN 2020).

As one of the five action tracks, Action Track 2 (AT2) had the theme of 'Shift to sustainable consumption patterns'. Its chair was Dr Gunhild Stordalen, who is the executive chair of the EAT Initiative, founded by the Stordalen foundation, the Stockholm Resilience Center under Professor Johan

Rockström and the Wellcome Trust (EAT 2023). On the EAT website it says that Stordalen is 'a published scientist...with a passionate commitment to food system transformation', and that she is a Young Global Leader of the World Economic Forum, as well serving on the World Economic Forum Stewardship Board on Food Systems (EAT 2023). Stordalen described her ambition for her AT2 leadership as follows: 'International summits rarely change the world by themselves, and especially not now given the global political climate. Our goal is therefore to take full advantage of the Summit to build an unstoppable global movement for change that we can keep growing well beyond the Summit, to force the kinds of far-reaching changes that the world now desperately need.' (EAT 2020). How these changes will be achieved was made clear in the preceding EAT-*Lancet* Report, where Johan Rockström was the second author, and Christopher Murray (of the GBD) the last name author, as follows: 'The scale of change to the food system is unlikely to be successful if left to the individual or the whim of consumer choice. This change requires reframing at the population and systemic level. Hard policy interventions include laws, fiscal measures, subsidies and penalties, trade configurations and other economic and structural measures... countries and authorities should not restrict themselves to narrow measures or soft interventions. Too often policy remains at the soft end of the policy ladder' (Willett *et al.* 2019, p. 478). Essentially, the entire leadership of AT2 was staffed with persons closely associated with the EAT Initiative. The public positioning of the choice for AT2 leadership left no doubt, although not explicitly mentioned like this, that the AT2 aims were to significantly reduce the amount of meat consumption, accompanied by a corresponding reduction of livestock, and, by self-declaration as described above, to force through this transformation by authoritarian 'hard' measures against the will of the consumer where necessary.

By May 2021, the Summit preparations had reached a major impasse. Most of the various stakeholder groups representing farmers, civil society and industry could not find common ground with representatives from AT2 on the role of livestock in a global food system. The transformational reduction of livestock envisioned and argued for by AT2 did not find approval among most of the other concerned stakeholder groups. To unblock the situation, it was decided to arrange a solution cluster called 'Sustainable Livestock' cutting across all action tracks, with three focal-point individuals nominated respectively by the World Farmers Organisation (WFO), the International Livestock Research Institute (ILRI) and CIAT Bioversity. The author of this article was the focal point appointed by WFO and therefore has knowledge of the proceedings first-hand. The cluster was installed on 17 May 2021 and tasked to curate a two-pager solution paper among an open-membership working group with approximately 70 different organisations. Four weeks later, 15 June 2021, the cluster had created such a document, which found approval by all these stakeholders.

Its tenor could be paraphrased with 'Much improvement is necessary, but livestock is part of the solution, not part of the problem' (the author's summary, P. Ederer). Two days later, on 17 June 2021, the three focal-point individuals were asked by the Summit leadership group to incorporate additional input from other stakeholders that had chosen not to participate thus far. These were representatives from Chatham House, Wellcome Trust, Oxford University, New York University, the Good Food Fund, 50by40, the Good Food Institute, Compassion in World Farming and FAIRR, with each of them being closely associated with AT2. A week later, inputs received from this group were as follows: 'That is nonsense', 'On farmer-driven roadmaps: in other areas such as energy, would it be acceptable for oil producers to decide a roadmap?', 'It is absurd to proposition a growth in the livestock as a solution', 'It is irrelevant that livestock farming has provided food, clothing, power, manure and income and acted as assets, collateral and status. Fossil fuel has done many of the same things', 'We are a 38 trillion investor network calling for sustainable agriculture system which importantly includes a shift to plant-rich diets and lower quantities of high-quality meat and dairy consumption' and similar (these quotes are taken from email conversations that were shared among many members of the solution cluster and therefore are neither private nor confidential).

It is legitimate for the individuals from these organisations to hold these views and express them as part of a stakeholder exchange. However, the focal points, and indeed all proceedings throughout the Summit, had been asked to ground proposals in either solid scientific evidence or existing practiced solutions. It was the view of the focal-point leaders, that the contributions of the 17 June 2021 group met neither of these two criteria. Since the solution cluster 'Sustainable Livestock' again could not agree on a joint position after the 17 June 2021 group began to weigh in, the proposal was then to create three different two-page solution papers with one jointly drafted opening paragraph, respectively called A, B and C papers, and then each respective stakeholder group could provide its scientific and practice evidence for each preferred solution pathway. The three solution papers would then become part of the Summit proceedings and be the starting point for so-called post-Summit Coalitions of Action. The three papers are available as online Supplementary material to this article (until Summer 2022, they were available for public download on the UNFSS website). The A-paper called 'Best Practices and Technologies' was similar to the first solution paper presented in mid-June 2021, calling for an emphasis on best practices, technologies and diversity to be a guide for rapid change, without defined targets for livestock numbers, but an acknowledgement that not enough livestock products are available to the global population (again, the author's summary, P. Ederer, see Supplementary material for the original papers). The B-paper called 'Grazing for Soil Climate and People' had a particular focus on grazing livestock. The C-paper called 'Aligning Production to

Consumption' was essentially a summary of the positions of organisations closely cooperating with the EAT Initiative and AT2 that livestock numbers and animal-sourced food consumption need to be significantly reduced. By finding this compromise formula of three separate solution papers, the impasse was solved, and the Summit could proceed to its concluding pre-Summit meeting at the end of July 2021 in Rome, with every stakeholder group satisfied that its position was somehow represented.

Each of the three A, B, C papers was extensively referenced to scientific journal articles, public-policy documents or existing practice descriptions. The Scientific Council of the WFO (SC-WFO) checked the quality of the references of each of the three papers (the author of this paper being a co-author of the SC-WFO as well). In the A and B papers, the evaluation found three references each that were not correct, of 45 and 56 respectively. However, among the 53 references of the C-paper, 17 were wrong or irrelevant sources unrelated to the statement, 22 were relevant but said either nothing about or even the opposite of the statement, and 18 sources employed demonstrably weak or manipulative methodologies that could easily be disqualified (multiple mention possible). Only 11 of 53 sources were correctly attributed and supported the statement. That was the quality of the science provided by the C-group, which supposedly was the competence centre of AT2 and EAT on the subject (see Supplementary material for the detailed draft evaluation of the SC-WFO analysis. It was not officially entered into the UN FSS process, and is thus made available here for the first time to a wider audience).

Two examples shall showcase how manipulated the sources of the C-paper could be. In one instance, a statement was made 'that significant reduction in global consumption of meat and dairy is needed...to minimise the use of antimicrobials'. This was referenced in footnote 15 to a well-known and respected Joint Scientific Opinion prepared by the European Medicines Agency and European Food Safety Authority in 2017 about antimicrobial agents. However, nowhere in that 245-page dense scientific treatise do these two agencies mention or imply that antimicrobial-agent use would be reduced, let alone minimised, via a reduction in the global consumption of meat and dairy. The second example is the well-cited Springmann *et al.* (2016). It was referenced twice in the C-paper of AT2 related stakeholders. Marco Springmann was also the co-author in the EAT *Lancet* 1.0 Commission, is a current Commissioner in the EAT *Lancet* 2.0 Commission, and was among the group who provided additional input on 17 June 2021. His 2016 article is called 'Analysis and valuation of the health and climate change co-benefits of dietary change'. According to PNAS where it was published, the article has been cited 707 times, and has been viewed a sizeable 460,000 times, so it is a successful article. In that work, the authors claim to have calculated that if all of humanity switched to a vegan diet, then 8.1 million deaths could be avoided per year on grounds of

improved health. The authors claim to have calculated this value based on the Global Burden of Disease (GBD) survey 2010. The vegan diet that they composed would avoid the GBD health risks of diets being low in fruit for 4.9 million avoided deaths, and low in vegetables yielding 1.8 million avoided deaths. Avoided deaths because of diets high in red meats falling away due to it being vegan, would contribute only 38,000 cases (according to GBD 2010, each value was extrapolated by some factor to adjust for population growth to then reach a total of 8.1 million avoided deaths). Clearly, the avoided death toll of the preferred diet had almost nothing to do with being 'vegan', and all with eating sufficient amounts of vegetables and fruits.

Springmann *et al.* (2016) is not a one-time exception in his publication record. In 2018, Springmann *et al.* published a follow-up study where they proceeded in the same fashion (2018 being funded by the Wellcome Trust and EAT, both among the 17 June 2021 contributors). They wrote 'Progressively replacing animal-source foods with plant-based foods led to progressive reductions in premature mortality of up to 12% in 2030'. But in the next sentence, they admitted that only a tenth of that reduction would be due to a reduction in red meat, the other 90% is due to an increase in vegetables, fruits and legumes. These latter food groups can be easily increased without having to reduce red meat as they are not mutually exclusive. So, framing these benefits as beneficial for a 'vegan' animal-sourced-food-free diet is false. Moreover, the analysis said nothing about white meat, dairy or eggs, which are also animal-sourced foods. The argument that these diets are called 'vegan' as a proper description for the parallel analysis of the environmental impact is disingenuous because similar manipulations can be identified in those just as much in both the 2016 and the 2018 works. (In the same article, Springmann *et al.* (2018) also modelled that a reduction of obesity and overweight by curtailing the provision of calories would decrease premature mortality by 8% (p. 456, fig. 2). This disregards that obesity is not a simple function of overeating calories, and paying no attention as to how this would be practically implemented. It is, however, a further example of the manipulative practice of science by Springmann *et al.* 2018). Nor has Springmann distanced himself from these articles in the meanwhile. In a letter to the editor of *Lancet Planet Health* in June 2023 (Springmann 2023), Springmann wrote that 'Eating a nutritionally adequate diet is possible without wrecking long term health, the planet or the pocket', and cited the 2018 article Springmann *et al.* (2018) as his primary evidence. There is a little sign in Springmann's work of NAS 2019 recommendation not to overstate the implications of research.

Discussion

If the poor science results shown in the three case studies are the results of agenda-driven scientists, and are not the result of

too little training in rigour, too little peer review or too little conflict of interest exposure, then what might be their agendas? Ultimately, only the scientists involved would be able to tell. However, Feynman's description of cargo cult science may offer a hint that these agendas could indeed have cult origins. Early Seventh Day Adventism, Transhumanism, Effective Altruism or Animal Rights (distinct from animal-welfare studies) are recent reinterpretations of long-standing eternity cults whose spiritual roots can be traced all the way back to the Mesopotamian Gilgamesh, pharaonic Egypt or eastern mythologies more than 4000 years ago (Szűcs *et al.* 2012; Besnier 2013; Thomas 2017). Each of these modern cults have strong agendas about the role of animals in modern society and therefore seek to strongly interfere in animal-related sciences. Several of the additional 17 June 2021 contributors in the UN Food Systems Summit described in the third case study, have their roots in the Animal Rights cult or share overlapping funding sources and personnel with Seventh Day Adventism, Transhumanism or Effective Altruism promoters (Luneau 2020).

How can scientific treaties about the role of animals in society be told apart on whether they are agenda-driven or integrity-driven? There may be a signal by which they can be distinguished; according to the functionalism view in sociology, cults and religion thrive on unifying truths, aim to make the knowledge space smaller and thus create a coherent community. Integrity science seeks the opposite; it aims to widen and deepen the knowledge space and open ever new frontiers (National Academies of Sciences, Engineering, and Medicine 2019). Accordingly, agenda-driven scientists may be identified by terms such as 'scientific consensus' whose aim it is to choke off debate and proclaim an unchallengeable truth. Knowledge discovering scientists, instead, can be identified by having more questions than answers. Paraphrasing Feynman, the biggest difference between the two is that *the airplanes of the agenda-scientists fail to land – always*.

How is it possible that the false results of agenda-driven scientists gain traction in enlightened society and take room amidst integrity science? The proposal of this article is, that this is where the society's request for truths enters the discussion. A society that wishes a problem be solved, struggles with answers that start with 'may-be', 'it depends', 'confidence interval', 'trade-off' or 'negative exclusions'. Agenda-driven scientists who readily supply a 'consensus truth' may easily win the competition for resources against an offer with integrity that says it will not know for certain (for an example of claim of consensus, Nicholas Carter 2024, page 4, falsely describes the EAT *Lancet* publication by Willett *et al.* 2019 as 'a growing scientific consensus', <https://www.thefreedomfoodalliance.org/report/home>).

To showcase an example from nutrition: how much protein should a person eat per day? The real answer is, it depends. It depends on age, health status, gender, activity profile, personal genetic circumstances, other types of food being

eaten, environmental conditions and personal preferences. Moreover, the question is wrong. The real question is what bioavailable amino acid composition should be provided to a person per day, and the answer is that today's nutritionists know surprisingly little about this (IAEA 2023). Science can reasonably state that people should not eat less than 10% of their caloric intake from proteins, and not more than 35%. Everything in between, depends. However, this is not what non-science decision makers may want to hear in public or private. They may want to be told 'what is', and not 'what is not'. Scientists who are willing to fill the gap and give the decision makers the truth they seek may be seen as more relevant, and may be rewarded with more research funding to find even more of that truth. That becomes the point through which agenda-driven scientists make their entry. They willingly deliver a truth that the decision maker is asking for, which the integrity scientist is hesitant to provide due to better knowledge about the limits of knowledge. For instance, Marco Springmann from the third case study does not hesitate to propagate his truth that a vegan diet saves human lives and reduces the environmental burden of food production on the planet, and appears to have no qualms about manipulating the data in broad daylight in support of such evidently falsified statements. For his proclamation of truths, Springmann has been awarded by the World Health Organization with the design of the European 'Diet Impact Assessment Model, a tool for analysing the health, environmental and affordability implications of dietary change', which predictably recommends to reduce or eliminate livestock-derived foods from the human diet (WHO European Region 2023). The WHO commissioning of this model to Springmann may also answer the question to what extent the WHO is undermined by agenda-driven scientists in the first case study.

Conclusions

According to Karl Popper, to practice science to justify a theory to be true, is to 'beg for an authoritarian answer' (p. 51). With that he meant an answer that is considered right not because it is grounded in reality, but because it is held by a person with authority who can issue truths. He did not consider the latter to be a good circumstance, because it ultimately leads to authoritarianism and loss of freedom. According to Popper, the purpose of knowledge is not to justify a theory, but to attempt to falsify a theory. The stance that science takes between the two, will therefore ultimately either restrict (by justifying theories) or promote (by falsifying theories) freedom for all of society. Self-governing and free scientific research is defined by the Ministerial Conference of the European Research Area as the hall mark of open, pluralistic, free and non-authoritarian society, as follows: 'Research and the freedom to conduct research are indispensable prerequisites for our social, cultural, political

and economic resilience and progress' (EU2020.de 2020, p. 2). According to notes by one of his students, the 19th century German philosopher Friedrich Hegel was once confronted with the following question by a student: 'but Professor Hegel, your theory does not agree with the facts', on which Hegel is said to have replied: 'that is too bad for the facts' (in German: 'Um so schlimmer für die Tatsachen'). Karl Popper characterised Friedrich Hegel as 'the father of modern historicism and totalitarianism' (Brooks 2021, section 1.1). Hegel knew the truth, where Popperians know the evidence.

Animal-related sciences are threatened by agenda-driven scientists. The third case study described above on the proceedings in the United Nations Food System Summit is a likely example of this. The agenda-driven contributors of AT2 stakeholders supplied their scientific-looking C-paper with 53 references, most of which are not related to the statements in the text, as outlined above. The form of scientific practice was kept, the integrity was not. Similarly, on the surface, Springmann *et al.* (2016, 2018) did everything right, including publishing their articles in the highest echelons of peer-reviewed journals and declaring their potential interests. The form of scientific practice was kept, the integrity of the interpretation was not. That airplane will not land. With regard to the IARC Working Group members or the GBD 2019 collaborators from the first two case studies, the reason for the resultant false science is unclear; whether it is insufficient rigour and reproducibility, conflict of interest, white hat bias or missionary zeal, time will tell.

This article proposes as a guide for scientists in any discipline related to animals, from nutrition to climate, and everything in between, to take not only the word, but also the entire concept of 'scientific truth' away from the mental toolkit. Popper would suggest that in the animal-related science disciplines, there are no truths about reality that an earnest scientist should hope to achieve. What can be hoped for is to use scientific evidence to narrow down the corridor, the confidence interval, of what is not the reality (the protein example above), or in the words of National Academies of Sciences, Engineering, and Medicine (2019), p. 30, 'to refine the degrees of confidence, rather than complete certainty'. Over time, this will safeguard the reputation and credibility of the animal-related scientists in society. It will make them fulfil their role to manage animals in modern society on the foundations of what is solidly known AND not known about physical, biological, chemical, social, economic and ethical conditions. With that search for scientific evidence, such integrity scientists will make their contribution to a free society that inhibits authoritarian attempts to force changes that citizens do not approve of. The airplanes of this kind of science will land.

Voices that are claiming scientific consensus to be on their side that the number of farmed animals and, concurrently, the amounts of animal-sourced foods must be radically reduced or even eliminated are becoming more frequent. These voices risk being caught out as cargo cult scientists. As a response

to these false claims of consensus, the co-authors of the Animal Frontiers April 2023 Special Issue launched the Dublin Declaration of Scientists on the Societal Role of Livestock in October 2022 (Dublin Declaration 2023; Leroy and Ederer 2023; Ederer and Leroy 2023). By early 2024, it has been signed by more than 1200 scientists around the world and remains open for signatures (www.dublin-declaration.org). It was conceived in the spirit of integrity science. Its first paragraph states that 'it aims to give voice to the many scientists around the world who research diligently, honestly and successfully in the various disciplines in order to achieve a balanced view of the future of animal agriculture'. The words 'truth' or 'true' do not appear in the Dublin Declaration.

Supplementary material

Supplementary material is available online.

References

- Allison DB, Brown AW, George BJ, *et al.* (2016) Reproducibility: a tragedy of errors. *Nature* 530, 27–29. doi:10.1038/530027a
- Anderson MS, Ronning EA, De Vries R, *et al.* (2007) The perverse effects of competition on scientists' work and relationships. *Science and Engineering Ethics* 13, 437–461. doi:10.1007/s11948-007-9042-5
- Bero LA, Grundy Q (2018) Not all influences on science are conflicts of interest. *American Journal of Public Health* 108(5), 632–633. doi:10.2105/AJPH.2018.304334
- Besnier J-M (2013) D'un désir mortifère d'immortalité. À propos du transhumanisme. *Cités* 55(3), 13–23. doi:10.3917/cite.055.0013. [In English]. Available at <https://www.cairn.info/revue-cites-2013-3-page-13.htm>
- Blaxter KL, Webster AJF (1991) Animal production and food: real problems and paranoia. *Animal Production* 53, 261–269. doi:10.1017/S0003356100020250
- Boobis AR, Cohen SM, Dellarco VL, Doe JE, Fenner-Crisp PA, Moretto A, Pastoor TP, Schoeny RS, Seed JG, Wolf DC (2016) Classification schemes for carcinogenicity based on hazard-identification have become outmoded and serve neither science nor society. *Regulatory Toxicology and Pharmacology* 82, 158–166. doi:10.1016/j.yrtph.2016.10.014
- Bouvard V, Loomis D, Guyton KZ, Grosse Y, Ghissassi FE, Benbrahim-Tallaa L, Guha N, Mattock H, Straif K, International Agency for Research on Cancer Monograph Working Group (2015) Carcinogenicity of consumption of red and processed meat. *The Lancet Oncology* 16, 1599–1600. doi:10.1016/S1470-2045(15)00444-1
- Brainard J, Jia Y (2018) What a massive database of retracted papers reveals about science publishing's 'death penalty'. Available at <https://www.science.org/content/article/what-massive-database-retracted-papers-reveals-about-science-publishing-s-death-penalty> [retrieved 24 April 2023]
- Brooks (2021) Hegel's Social and Political Philosophy. Available at <https://plato.stanford.edu/entries/hegel-social-political/>
- Brüssow H (2022) What is truth – in science and beyond. *Environmental Microbiology* 24, 2895–2906. doi:10.1111/1462-2920.16080
- Cremieux R (2023) Ranking Fields by p-Value Suspiciousness. Analysis published on substack. Available at <https://cremieux.substack.com/p/ranking-fields-by-p-value-suspiciousness> [retrieved 24 April 2023]
- Cope MB, Allison DB (2010) White hat bias: examples of its presence in obesity research and a call for renewed commitment to faithfulness in research reporting. *International Journal of Obesity* 34, 84–88. doi:10.1038/tjo.2009.239
- Dublin Declaration (2023) Dublin Declaration of Scientists on the Societal Role of Livestock. *Animal Frontiers* 13(2), 10. doi:10.1093/af/vfad013

- EAT (2020) EAT at the UN Food Systems Summit 2021. Available at <https://eatforum.org/learn-and-discover/eat-at-the-un-food-systems-summit-2021/> [retrieved on 24 April 2023]
- EAT (2023) What is EAT. Available at <https://eatforum.org/about/who-we-are/what-is-eat/> [retrieved 24 April 2023]
- Ederer P, Leroy F (2023) The societal role of meat: what the science says. *Animal Frontiers* 13(2), 3–8. doi:10.1093/af/vfac098
- EU2020.de (2020) Bonn Declaration on Freedom of Scientific Research. Available at https://www.bmbf.de/bmbf/shareddocs/downloads/files/drpf-efr-bonner-erkl%C3%A4rung_en_with-signatures_maerz_2021.pdf?_blob=publicationFile&v=1
- Feynman RP (1974) Cargo Cult Science. Available at <https://calteches.library.caltech.edu/51/2/CargoCult.htm>
- Fisch F (2018) Conflicts of interest: transparency is not enough, in Horizon, the Swiss Research Magazine. Available at <https://www.horizons-mag.ch/2018/12/06/conflicts-of-interest-transparency-isnt-enough/>
- Flyvbjerg B (2006) Five misunderstandings about case-study research. *Qualitative Inquiry* 12(2), 219–245. doi:10.1177/1077800405284363
- GBD 2019 (2020) Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* 396(10258), 1204–1222. doi:10.1016/S0140-6736(20)30925-9
- Gordon-Dseagu VLZ, Wiseman MJ, Allen K, *et al.* (2022) Troubling assumptions behind GBD 2019 on the health risks of red meat. *The Lancet* 400(10350), 427–428. doi:10.1016/S0140-6736(22)01283-1
- Horton R (2015) Offline: what is medicine's 5 sigma? *The Lancet* 385(9976), 1380. doi:10.1016/S0140-6736(15)60696-1
- Hoppe R (1999) Policy analysis, science and politics: from 'speaking truth to power' to 'making sense together'. *Science and Public Policy* 26(3), 201–210. doi:10.3152/147154399781782482
- IAEA (2023) International Symposium on 'Dietary Protein for Human Health' (organized in cooperation with the IAEA). Available at <https://www.iaea.org/events/evt2100453>
- IARC (2018) Red Meat and Processed Meat, Vol. 114. Available at <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Red-Meat-And-Processed-Meat-2018>
- Ioannidis JPA (2005) Why most published research findings are false. *PLoS Medicine* 2(8), e124. doi:10.1371/journal.pmed.0020124
- Ioannidis JPA (2016) The mass production of redundant, misleading, and conflicted systematic reviews and meta-analyses. *The Milbank Quarterly* 94(3), 485–514. doi:10.1111/1468-0009.12210
- John LK, Loewenstein G, Marder A, Callahan ML (2019) Effect of revealing authors' conflicts of interests in peer review: randomized controlled trial. *The BMJ* 367, l5896. doi:10.1136/bmj.l5896
- Johnston BC, Zeraatkar D, Han MA, Vernooij RWM, Valli C, El Dib R, *et al.* (2019) Unprocessed red meat and processed meat consumption: dietary guideline recommendations from the Nutritional Recommendations (NutriRECS) consortium. *Annals of Internal Medicine* 171, 756–764. doi:10.7326/M19-1621
- Johnston B, De Smet S, Leroy F, Mente A, Stanton A (2023) Non-communicable disease risk associated with red and processed meat consumption-magnitude, certainty, and contextuality of risk? *Animal Frontiers* 13(2), 19–27. doi:10.1093/af/vfac095
- Klurfeld DM (2018) What is the role of meat in a healthy diet? *Animal Frontiers* 8(3), 5–10. doi:10.1093/af/vfy009
- Kruger C, Zhou Y (2018) Red meat and colon cancer: a review of mechanistic evidence for heme in the context of risk assessment methodology. *Food and Chemical Toxicology* 118, 131–153. doi:10.1016/j.fct.2018.04.048
- Leroy F, Ederer P (2023) The Dublin Declaration of Scientists on the Societal Role of Livestock. *Nature Food* 4, 438–439. doi:10.1038/s43016-023-00784-z
- Lescinsky H, Afshin A, Ashbaugh C, *et al.* (2022) Health effects associated with consumption of unprocessed red meat: a Burden of Proof study. *Nature Medicine* 28, 2075–2082. doi:10.1038/s41591-022-01968-z
- Luneau G (2020) Steak Barbare – Hold-up vegan sur l'assiette, published by De L Aube. Available at https://editionsdelaube.fr/catalogue_de_livres/steak-barbare/
- Massimi M (2019) Getting it right: Truth is neither absolute nor timeless. But the pursuit of truth remains at the heart of the scientific

endeavour. Aeon. Available at <https://aeon.co/essays/its-time-for-a-robust-philosophical-defence-of-truth-in-science>

McNutt M (2014) Reproducibility. *Science* 343, 229–229. doi:10.1126/science.1250475

Murray CJL (2022) 36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable? Author's reply. *The Lancet* 399(10332), e27–e28. doi:10.1016/S0140-6736(22)00518-9

National Academies of Sciences, Engineering, and Medicine (2019) 'Reproducibility and Replicability in Science.' (The National Academies Press: Washington, DC, USA) doi:10.17226/25303

NIH (2023) Guidance: rigor and reproducibility in grant applications. Available at <https://grants.nih.gov/policy/reproducibility/guidance.htm> [retrieved 24 April 2023]

OECD (2017) Governing better through evidence-informed policy making, Conference Summary. Available at <https://www.oecd.org/gov/governing-better-through-evidence-informed-policy-making-proceedings.pdf>

Oransky I (2022) Retractions are increasing, but not enough. *Nature* 608, 9. doi:10.1038/d41586-022-02071-6

Pethick DW, Bryden WL, Mann NJ, Masters DG, Lean LJ (2023) The societal role of meat: the Dublin Declaration with an Australian perspective. *Animal Production Science* 63(18), 1805–1826. doi:10.1071/AN23061

Plato (2018) Reproducibility of Scientific Results. Available at <https://plato.stanford.edu/entries/scientific-reproducibility/>

Popper K (1960) Knowledge without authority. In 'Popper Selections'. (Ed. D Miller) (Princeton University Press 1985)

Sackett DL (1979) Bias in Analytic Research. *Journal of Chronic Disease* 32, 51–63. Available at <https://www.jamesindlibrary.org/wp-data/uploads/2014/06/Sackett-1979-whole-article.pdf>

Silva RS (2014) O papel dos valores nas ciências Sociais e Humanas. *Kairos* 11, 59–90. Available at <https://repositorio.ul.pt/bitstream/10451/60137/1/Kairos%2011%20O%20Papel%20dos%20Valores%20nas%20Ci%C3%A7%C3%A2ncias%20Sociais%20e%20Humanas.pdf>

Springmann M (2023) Eating a nutritionally adequate diet is possible without wrecking long-term health, the planet, or the pocket. *The Lancet Planetary Health* 7, e544. doi:10.1016/S2542-5196(23)00129-8

Springmann M, Godfray HCJ, Rayner M, Scarborough P (2016) Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences* 113(15), 4146–4151. doi:10.1073/pnas.1523119113

Springmann M, Wiebe K, Mason-D'Croz D, et al. (2018) Health and nutritional aspects of sustainable diet strategies and their association with

environmental impacts: a global modelling analysis with country-level detail. *The Lancet Planetary Health* 2(10), e451–e461. doi:10.1016/S2542-5196(18)30206-7

Stanton AV, Leroy F, Elliott C, et al. (2022) 36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable? *The Lancet* 399(10332), e23–e26. doi:10.1016/S0140-6736(22)00311-7

Szűcs E, Geers R, Jezierski T, Sossidou EN, Broom DM (2012) Animal welfare in different human cultures, traditions and religious faiths. *Asian-Australasian Journal of Animal Sciences* 25(11), 1499–1506. doi:10.5713/ajas.2012.r.02

The Lancet (2014) Research: increasing value, reducing waste. Available at <https://www.thelancet.com/series/research>

The Lancet Oncology (2016) When is a carcinogen not a carcinogen? *The Lancet Oncology* 17(6), P681. doi:10.1016/S1470-2045(16)30138-3

Thomas A (2017) Super-intelligence and eternal life: transhumanism's faithful follow it blindly into a future for the elite. *The Conversation*. UN (2019) What is the Food Systems Summit?. Available at <https://www.un.org/en/food-systems-summit/about> [retrieved 24 April 2023]

UN (2020) Bold actions for food as a force for good. Available at <https://www.un.org/en/food-systems-summit/events/bold-actions-food-force-good> [retrieved 24 April 2023]

Valdez D, Vorland CJ, Brown AW, et al. (2020) Improving open and rigorous science: ten key future research opportunities related to rigor, reproducibility, and transparency in scientific research. *FI000Research* 9, 1235. doi:10.12688/fi000research.26594.1

WFO (2021) Synopsis paper by Scientific Council of World Farmers Organisation: Consumption of unprocessed red meat is not a risk to health. Available at https://www.wfo-oma.org/wp-content/uploads/2021/07/SC-WFO-Synopsis-Paper-on-Unprocessed-Red-Meat-Consumption_final.pdf

WHO European Region (2023) The Diet Impact Assessment model: a tool for analyzing the health, environmental and affordability implications of dietary change, Document number: WHO/EURO:2023-8349-48121-71370. Available at <https://www.who.int/europe/publications/i/item/WHO-EURO-2023-8349-48121-71370#:~:text=The%20tool%20enables%20countries%20to,those%20associated%20with%20food%20related>

Willett W, Rockström J, Loken B, et al. (2019) Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet* 393(10170), 447–492. doi:10.1016/S0140-6736(18)31788-4

Data availability. The Supplementary material supplies analyses and data conducted in reference to the case study on the UN Food Systems Summit 2021.

Conflicts of interest. The author is a non-remunerated member of the Scientific Council of the World Farmers Organisation. The Scientific Council is by charter an independent body to the WFO. The author operates the Global Observatory on Accurate Livestock Sciences, GOALSciences in short (www.goalsciences.org), as part of the Global Food and Agribusiness Network, GFAN in short. GFAN is a professional research company which the author owns, which is registered in Switzerland. GFAN has been serving numerous public- and private-sector clients with executive teaching and research products. None of these clients has directly or indirectly been related to, provided funds for, or been involved in the writing of this article, or its underlying research body.

Declaration of funding. This research did not receive any specific funding.

Acknowledgements. The main line of reasoning for this article was first presented at the British Society for Animal Science Conference on 30 March 2023 in Birmingham as an invited speaker in the Symposium on the importance of meat in human health, chaired and arranged by Professor Michael Lee. The article has benefitted immensely from reviews conducted by Professor Frederic Leroy, Professor Guiseppe Pulina and Professor Ron Meyer, as well as several anonymous reviewers of the journal.

Author affiliation

[†]GOALSciences at Global Food and Agribusiness Network, Rapperswil, Switzerland.



Calling all grain & vegetable producers

JOIN OUR Farm Management Practices Survey



Survey details

TOPIC

Implications of farming practices in grain and vegetable production systems in three regions of the Western Cape

PURPOSE

Identify the farmer implications of farm management practices



DURATION

Approximately 20-35 minutes

QUESTIONS OR CONCERNS?

We're here to help!

Contact our team at

jadea@sun.ac.za, willemhh@sun.ac.za or

johannst@elsenburg.com

You are eligible if:

- You are a vegetable or grain producer;
- Your farm is located in the Western Cape; and
- You use conservation or conventional farming practices



ABOUT THE STUDY

The study forms part of a doctoral research project based on a long-term investigation of the feasibility of conservation agriculture in vegetable production systems.

The study aims to identify the challenges and benefits farmers face with different management practices (conservation and conventional agriculture) in grain and vegetable production systems several regions of the Western Cape.

HOW TO PARTICIPATE

Visit our survey website:

<https://forms.office.com/r/FhZMYSuUis>

or scan the QR code:



Why participate?

Your expertise matters

Voice your concerns and opinions

Support research

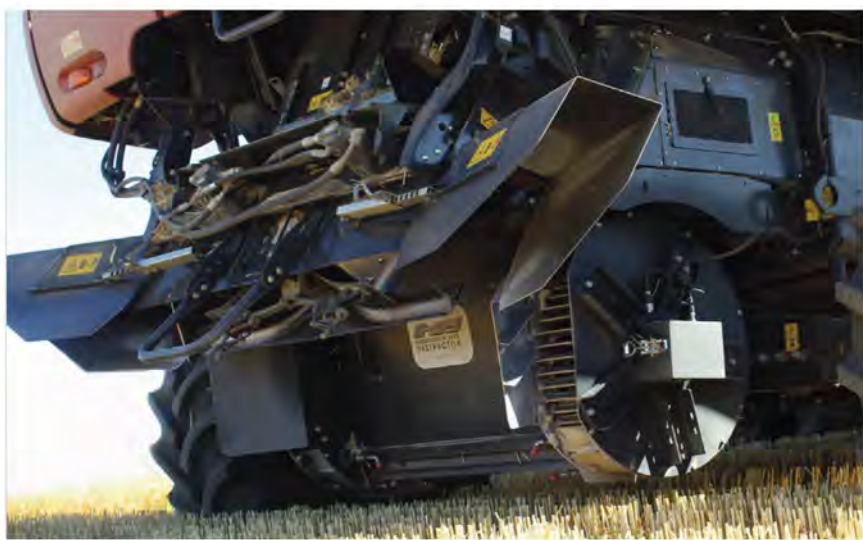
Help us understand practical successes & challenges

Shape the future

Your input drives positive change

ETHICAL CLEARANCE GRANTED BY STELLENBOSCH UNIVERSITY (27743)

iHSD for CASE IH – SPECIAL PRICE!!



WE HAVE AN MY2022 BRAND NEW IN THE BOX FOR SALE AT WHOLESALE PRICE. MACHINE IS IN CAPE TOWN !!!

R995,000.00 EX VAT**

** excludes delivery from CPT, excludes installation

CURRENT YEAR RRP IS R1,500,000.00 EX VAT **

CHECK OUT OUR FACEBOOK PAGE FOR GREAT VIDEOS.

<https://www.facebook.com/SeedDestructorRSA>

AND VISIT OUR GLOBAL WEBSITE – WWW.IHSD.COM

iHSD for JOHN DEERE –SPECIAL PRICE!



WE HAVE AN MY2022 BRAND NEW IN THE BOX FOR SALE AT WHOLESALE PRICE. MACHINE IS IN CAPE TOWN !!!

± R980,000.00 EX VAT**

** excludes delivery from CPT, excludes installation.

Price varies based on JD model

CURRENT YEAR RRP IS R1,400,000.00 EX VAT ** MODEL DEPENDANT

CHECK OUT OUR FACEBOOK PAGE FOR GREAT VIDEOS.

<https://www.facebook.com/SeedDestructorRSA>

AND VISIT OUR GLOBAL WEBSITE – WWW.IHSD.COM

KILL RESISTANT WEEDS
WHILE HARVESTING



Harvest Weed Seed Control
Simpler. Better.
visit ihsd.com

iHSD
HARRINGTON SEED
DESTRUCTOR



HOW IT WORKS.

- ▶ Standing weeds are harvested by the combine
- ▶ Weed seeds or pods are separated into the chaff stream
- ▶ Chaff containing weed seeds is processed by the mills until weed seeds and volunteer seeds are no longer viable
- ▶ Processed chaff and weed seeds are spread over the field as inert organic material

KEY FEATURES.



-  **DIRECT MECHANICAL DRIVE**
Less moving parts, more efficient. Simple.
-  **REAR HATCH ACCESS**
For simple grain loss checks
-  **BI-DIRECTIONAL AUGER**
To actively feed the mills, avoiding blockages
-  **STONE TRAP**
Avoids foreign objects entering mills
-  **EASY BYPASS**
For windrowing and/or harvesting without iHSD

SIMPLER. BETTER.

TENSIONING PULLEY
Minimising belt slip

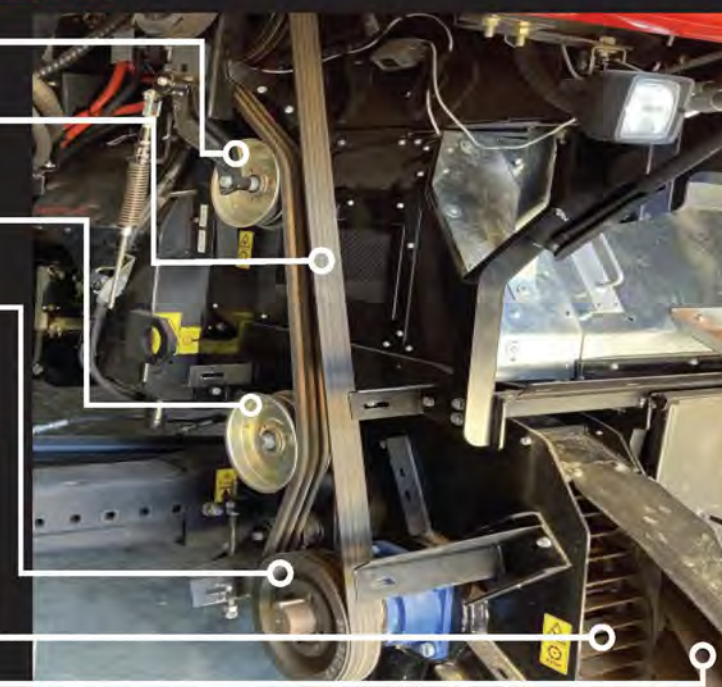
HEAVY DUTY DRIVE BELT
Transmitting torque for power

ADJUSTABLE IDLER PULLEY
Adjust belt wrap and grip

IHSD DRIVE PULLEY
Drive pulley maintaining 3000 rpm mill speed

PATENTED IHSD MILLS
2 x vertical mechanical mills
Hardened steel

EXTERNAL CHAFF CHUTE
Direct output below straw to minimise dust



“We knew it had been tested for years, which gives you confidence, and it seemed that they had a lot better capacity. The size of the throat, where the material goes down into the mill, is huge!”
 - Sandy Day, Riverina, NSW



“Burning windrows would normally take a couple of weeks and a lot of late nights. Now that we have the Seed Destructor, we’ve saved organic matter, labour and time, not to mention a plus for the environment.”
 - Roger Dring, Carnamah WA

“It’s a bit addictive. You see some ryegrass near the gate so you drive the header over there to make sure you get it and then keep going. You know that at least 99% of all the weeds that go through the front aren’t going to germinate.”
 - Ian Knapp, Katanning WA

RESULTS SPEAK FOR THEMSELVES.



Weed species	Seed No.	Seed kill (%)
Annual ryegrass	1000	96%
Wild oats	200	99%
Brome grass	200	98%
Awnless barnyard grass	1000	99%
Flaxleaf fleabane	25000	99%
Sow thistle	3000	99%
Wild radish	200	99%
Indian hedge mustard	2000	99%
Windmill grass	3000	97%
Barley grass	500	99%
Feathertop Rhodes grass	3000	98%

Walsh MJ, Broster JC, Powles SB (2017) iHSD mill efficacy on the seeds of Australian cropping system weeds. Weed Technology.

KEY FEATURES:

- ✓ DESTROY UP TO 99.9% OF TARGETED WEED SPECIES
- ✓ ONE PASS HARVEST WEED SEED CONTROL
NO CHAFF CARTS, NO WINDROWS, NO BURNING
- ✓ PROVEN
OVER A DECADE OF COMMERCIALY BUILT HSD AND IHSD PRODUCTS
- ✓ IMPROVES FUTURE WEED CONTROL
REDUCES HERBICIDE RESISTANT WEEDS
- ✓ AUSTRALIAN DESIGNED & BUILT
25 YEARS OF RESEARCH, DEVELOPMENT, TESTING & REFINEMENT



RAY HARRINGTON.

Western Australian farmer, Ray Harrington, has spent more than 20 years developing methods for harvest weed seed management, the results of which have led to the iHSD.

de Bruin Engineering reserve the right to make changes in engineering or specifications at any time without notice. Although every effort has been made to display accurate information, no responsibility will be taken for any errors contained in this publication.

AVAILABLE TO FIT MODELS:

New Holland		CASE IH			John Deere	
9090	10.90	9250	8250	7250	S690	S790
8090	9.90	9240	8240	7240	S680	S780
9080	8.90	9230	8230	7230	S670	S770
9070		9120	8120			

www.ihsd.com

Facebook Twitter YouTube Instagram

@SeedDestructor

SIMPLER. BETTER.

Dealer Information:

iHSD products are designed and manufactured in Australia by de Bruin Engineering Pty Ltd. Core iHSD Mill Technology was developed by UniSA with funding and support from GRDC. Through GRDC, licencing fees and royalties on HSD and iHSD products are used to enhance research in gricultural systems and fund programmes to benefit grain growers.

KILL RESISTANT WEEDS
WHILE HARVESTING



Harvest Weed Seed Control
Simpler. Better.
visit ihsd.com



HOW IT WORKS.

- ▶ Standing weeds are harvested by the combine
- ▶ Weed seeds or pods are separated into the chaff stream
- ▶ Chaff containing weed seeds is processed by the mills until weed seeds and volunteer seeds are no longer viable
- ▶ Processed chaff and weed seeds are spread over the field as inert organic material

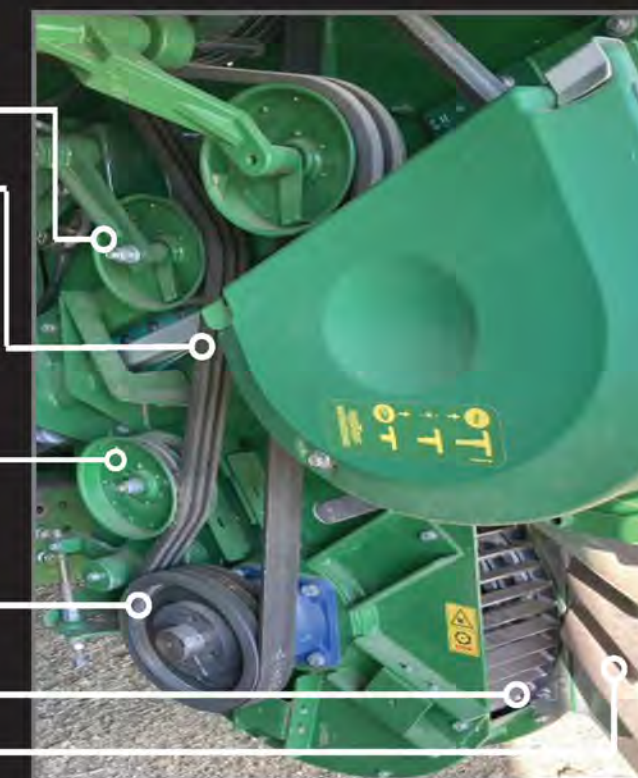
KEY FEATURES.



-  **DIRECT MECHANICAL DRIVE**
Less moving parts, more efficient. Simple.
-  **REAR HATCH ACCESS**
For simple grain loss checks
-  **BI-DIRECTIONAL AUGER**
To actively feed the mills, avoiding blockages
-  **STONE TRAP**
Avoids foreign objects entering mills
-  **EASY BYPASS**
For windrowing and/or harvesting without IHSD

SIMPLER. BETTER.

- TENSIONING PULLEY**
Minimising belt slip
- HEAVY DUTY DRIVE BELT**
Transmitting torque for power
- ADJUSTABLE IDLER PULLEY**
Adjust belt wrap and grip
- IHSD DRIVE PULLEY**
Drive pulley maintaining 3000 rpm mill speed
Optional disengagement clutch
- PATENTED IHSD MILLS**
2 x vertical mechanical mills
Hardened steel
- EXTERNAL CHAFF CHUTE**
Direct output below straw to minimise dust



“We knew it had been tested for years, which gives you confidence, and it seemed that they had a lot better capacity. The size of the throat, where the material goes down into the mill, is huge!”
 - Sandy Day, Riverina, NSW



“Burning windrows would normally take a couple of weeks and a lot of late nights. Now that we have the Seed Destructor, we’ve saved organic matter, labour and time, not to mention a plus for the environment.”
 - Roger Dring, Carnamah WA

“It’s a bit addictive. You see some ryegrass near the gate so you drive the header over there to make sure you get it and then keep going. You know that at least 99% of all the weeds that go through the front aren’t going to germinate.”
 - Ian Knapp, Katanning WA

RESULTS SPEAK FOR THEMSELVES.



Weed species	Seed No.	Seed kill (%)
Annual ryegrass	1000	96%
Wild oats	200	99%
Brome grass	200	98%
Awnless barnyard grass	1000	99%
Flaxleaf fleabane	25000	99%
Sow thistle	3000	99%
Wild radish	200	99%
Indian hedge mustard	2000	99%
Windmill grass	3000	97%
Barley grass	500	99%
Feathertop Rhodes grass	3000	98%

Walsh MJ, Broster JC, Powles SB (2017) iHSD mill efficacy on the seeds of Australian cropping system weeds. Weed Technology.

KEY FEATURES:



- ✓ DESTROY UP TO 99.9% OF TARGETED WEED SPECIES
- ✓ ONE PASS HARVEST WEED SEED CONTROL
NO CHAFF CARTS, NO WINDROWS, NO BURNING
- ✓ PROVEN
OVER A DECADE OF COMMERCIALY BUILT HSD AND IHSD PRODUCTS
- ✓ IMPROVES FUTURE WEED CONTROL
REDUCES HERBICIDE RESISTANT WEEDS
- ✓ AUSTRALIAN DESIGNED & BUILT
25 YEARS OF RESEARCH, DEVELOPMENT, TESTING & REFINEMENT



RAY HARRINGTON.
 Western Australian farmer, Ray Harrington, has spent more than 20 years developing methods for harvest weed seed management, the results of which have led to the iHSD.

de Bruin Engineering reserve the right to make changes in engineering or specifications at any time without notice. Although every effort has been made to display accurate information, no responsibility will be taken for any errors contained in this publication.

AVAILABLE TO FIT MODELS:

New Holland		CASE IH			John Deere	
9090	10.90	9250	8250	7250	S690	S790
8090	9.90	9240	8240	7240	S680	S780
9080	8.90	9230	8230	7230	S670	S770
9070		9120	8120			

www.ihsd.com

@SeedDestructor
SIMPLER. BETTER.

Dealer Information:

iHSD products are designed and manufactured in Australia by de Bruin Engineering Pty Ltd. Core iHSD Mill Technology was developed by UniSA with funding and support from GRDC. Through GRDC, licencing fees and royalties on HSD and iHSD products are used to enhance research in gricultural systems and fund programmes to benefit grain growers.

**KILL RESISTANT WEEDS
WHILE HARVESTING**



Harvest Weed Seed Control
Simpler. Better.
visit ihsd.com



HOW IT WORKS.

- ▶ Standing weeds are harvested by the combine
- ▶ Weed seeds or pods are separated into the chaff stream
- ▶ Chaff containing weed seeds is processed by the mills until weed seeds and volunteer seeds are no longer viable
- ▶ Processed chaff and weed seeds are spread over the field as inert organic material

KEY FEATURES.



-  **DIRECT MECHANICAL DRIVE**
Less moving parts, more efficient. Simple.
-  **REAR HATCH ACCESS**
For simple grain loss checks
-  **BI-DIRECTIONAL AUGER**
To actively feed the mills, avoiding blockages
-  **STONE TRAP**
Avoids foreign objects entering mills
-  **EASY BYPASS**
For windrowing and/or harvesting without iHSD

SIMPLER. BETTER.

TENSIONING PULLEY
Minimising belt slip

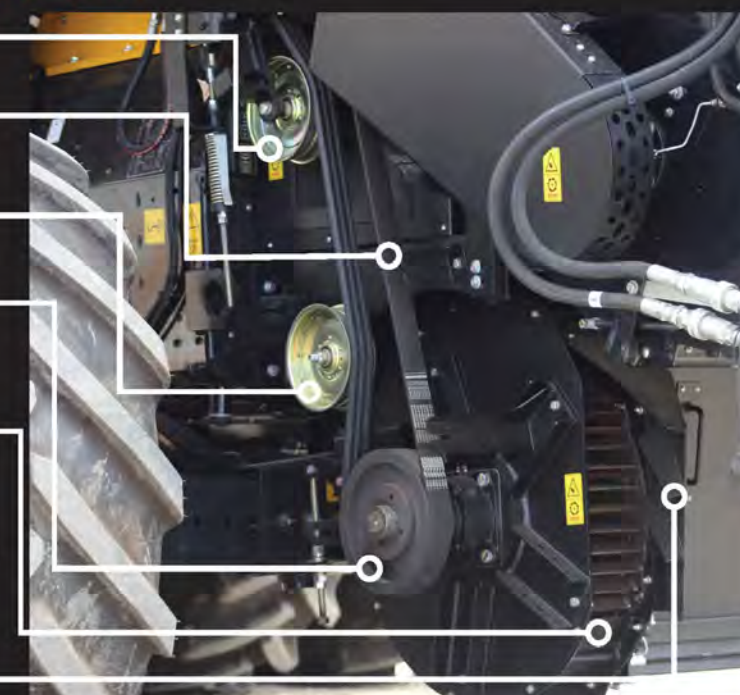
HEAVY DUTY DRIVE BELT
Transmitting torque for power

ADJUSTABLE IDLER PULLEY
Adjust belt wrap and grip

IHSD DRIVE PULLEY
Drive pulley maintaining 3000 rpm mill speed

PATENTED IHSD MILLS
2 x vertical mechanical mills
Hardened steel

EXTERNAL CHAFF CHUTE
Direct output below straw to minimise dust



“We knew it had been tested for years, which gives you confidence, and it seemed that they had a lot better capacity. The size of the throat, where the material goes down into the mill, is huge!”
- Sandy Day, Riverina, NSW

“Burning windrows would normally take a couple of weeks and a lot of late nights. Now that we have the Seed Destructor, we’ve saved organic matter, labour and time, not to mention a plus for the environment.”
- Roger Dring, Carnamah WA

“It’s a bit addictive. You see some ryegrass near the gate so you drive the header over there to make sure you get it and then keep going. You know that at least 99% of all the weeds that go through the front aren’t going to germinate.”
- Ian Knapp, Katanning WA



RESULTS SPEAK FOR THEMSELVES.



Weed species	Seed No.	Seed kill (%)
Annual ryegrass	1000	96%
Wild oats	200	99%
Brome grass	200	98%
Awnless barnyard grass	1000	99%
Flaxleaf fleabane	25000	99%
Sow thistle	3000	99%
Wild radish	200	99%
Indian hedge mustard	2000	99%
Windmill grass	3000	97%
Barley grass	500	99%
Feathertop Rhodes grass	3000	98%

Walsh MJ, Broster JC, Powles SB (2017) iHSD mill efficacy on the seeds of Australian cropping system weeds. Weed Technology.

KEY FEATURES:

- ✓ DESTROY UP TO 99.9% OF TARGETED WEED SPECIES
- ✓ ONE PASS HARVEST WEED SEED CONTROL
NO CHAFF CARTS, NO WINDROWS, NO BURNING
- ✓ PROVEN
OVER A DECADE OF COMMERCIALY BUILT HSD AND IHSD PRODUCTS
- ✓ IMPROVES FUTURE WEED CONTROL
REDUCES HERBICIDE RESISTANT WEEDS
- ✓ AUSTRALIAN DESIGNED & BUILT
25 YEARS OF RESEARCH, DEVELOPMENT, TESTING & REFINEMENT



RAY HARRINGTON.

Western Australian farmer, Ray Harrington, has spent more than 20 years developing methods for harvest weed seed management, the results of which have led to the iHSD.

de Bruin Engineering reserve the right to make changes in engineering or specifications at any time without notice. Although every effort has been made to display accurate information, no responsibility will be taken for any errors contained in this publication.

AVAILABLE TO FIT MODELS:

New Holland		CASE IH			John Deere	
9090	10.90	9250	8250	7250	S690	S790
8090	9.90	9240	8240	7240	S680	S780
9080	8.90	9230	8230	7230	S670	S770
9070		9120	8120			

www.ihsd.com

@SeedDestructor
SIMPLER. BETTER.

Dealer Information:

iHSD products are designed and manufactured in Australia by de Bruin Engineering Pty Ltd. Core iHSD Mill Technology was developed by UniSA with funding and support from GRDC. Through GRDC, licencing fees and royalties on HSD and iHSD products are used to enhance research in gricultural systems and fund programmes to benefit grain growers.



Brad Block | 073 465 0688
brad@ihsd.co.za

www.iHSD.com

iHSD South Africa

Destroy 99% of weed seeds WHILE YOU HARVEST

Brad Block, iHSD agent

Grain producers across South Africa are constantly battling herbicide-resistant weeds and in most parts are losing the battle. In Australia, the United States and Europe, producers are using impact mill technology as part of their harvest weed seed control (HWSC) ... and now you can too.

The integrated Harrington Seed Destructor (iHSD) has been developed and manufactured in South Australia over the last twelve years by De Bruin Engineering in conjunction with the University of South Australia and the Grains Research and Development Council of Australia (GRDC). The latest model, the V12, is mechanically driven and integrated into the combine and receives the chaff containing weed seeds. The patented vertical impact mills rotate at 3 000 rpm, completely pulverising anything that enters the mill cages.

Since early last year the iHSD has been available in South Africa, with the first machine sold by Overberg Agri to Dreyer van Niekerk of Lemoenskop Boerdery in Caledon, Western Cape. They ran the iHSD for 400 hours on their 3 500-ha farm, handling wheat, barley and canola without issue.

The iHSD is made to fit Case IH, John Deere, New Holland and Claas*. Please note that orders can take three months to ship. ●

For more information and for enquiries visit www.iHSD.com.
*limited models.

'I have been using the Seed Destructor for a year. I am very satisfied with the service as well as the results after one year. Definitely something to look at in the future of agriculture.'
– Dreyer van Niekerk

Dreyer van Niekerk from Lemoenskop Boerdery with his iHSD.



PRODUCT INFORMATION

RESULTS SPEAK FOR THEMSELVES.



SIMPLER. BETTER.



enquiries - brad@ihsd.co.za

iHSD
HARRINGTON SEED
DESTRUCTOR

www.iHSD.com



Programme 9WCCA - July 2024

14h00 to 18h30	Arrival and Registration - CTICC
16h00 to 18h30	Movie: "Roots So Deep (you can see the devil down there)" with a short Q&A with Prof Peter Byck. Will be hosted in the CTIC
19h00	Welcome Cocktail

Plenary sessions		
Venue 1		
Time		
07h00 to 08h00	Late Arrival Registration	

Opening session				Time allocation
08h05 to 09h15	Welcome addresses			
	Prof Johann Strauss	Welcome from LOC		5
		Western Cape Welcome		20
		National Welcome		20
	FAO DDG Bechol	FAO Welcome		20

Session 1: Conservation Agriculture around the world			
	Moderator	Dr Ilse Truettmann	60
09h20 to 09h50	Dr Theodor Friedrich	The drivers and systems of successful adoption of CA in different parts of the world	30
09h55 to 10h25	Saidi Mkomwa	Resolutions from 3ACCA	30
	Rapporteur	Ms Annelene Swanepoel	

10h25 to 10h55	Coffee break		
----------------	--------------	--	--

Session 2: Conservation Agriculture Challenges			
	Moderator	Prof Pieter Swanepoel	60
11h00 to 11h30	Prof Ken Flower	Reliance on herbicides – The Achilles heel of Conservation Agriculture in Australia	30
11h35 to 11h55	Prof Peter Byck	Soil Health, Farmer Wealth: can AMP grazing get farmers out of debt, restore the land and be a climate solution?	30
	Rapporteur	Ms Charne Viljoen	

12h00 to 12h55	Lunch			55
----------------	-------	--	--	----

Session 3: Crops and Crop Live/Stock CA systems			
13h30 to 15h30	Moderator	Dr Hendrik Smith	90
	Cobus Bester	CA under Mediterranean conditions in the Western Cape	20
	Danie Bester	CA under Summer rainfall in Mpumalanga	20
	Rick Clark	American Farmer - title to be confirmed	30
	Farmer Panel Discussion		60
	Egon Zunkle	RSA	
	Vikas Chaudhary	India	
	Alfred Fast	Paraguay	
	Emilio Gonzalez	Spain	
	Rick Clark	America	
	Rapporteur	Prof Johann Strauss	

15h30 to 16h00	Coffee Break		
----------------	--------------	--	--

Session 4: Extensive Livestock systems			
16h05 to 16h55	Moderator	Andrew Ardington	50
	DF Fyver	South Africa	
	Danie Slabbert	South Africa	
	James Brodie	South Africa	
	Peter Byck	America	
	Rapporteur	Ms Liane Erasmus	

Session 4: Role of sustainable agricultural mechanization in scaling the adoption of smallholder CA in Africa			
17h00 - 19h00	Moderator	ADG Abebe Haile-Gabriel	120
	Dr Bram Govaerts	Scaling of regenerative CA via sustainable agricultural mechanization – the CIMMYT approach	30
	Panel Discussion		90
	Saidi Mkomwa - ACT Network	Introductory remarks about the F-SAMA and the session	
	HE Madam Josefa Sacko - ARBE, AUC	Retiring the Hand Hoe to the museum, and the Call to Action to Member States, Private Sector and development partners	
	African Development Bank (TBC)	Directions for investments in sustainable agricultural mechanization with CA	
	International Maize and Wheat Improvement Center (CIMMYT)	Digitalization and innovative financing opportunities in enhancing access to machinery hire services	
	Andriamady Randromalala, Director Mechanization Madagascar, Vice Chair Committee of Directors of Mechanization	Organizational structures for formal collaboration of national governments' Directors of Agricultural Mechanization and Extension Services (DAMES)	
	Josef Kienzie, FAO	The futuristic perspective of operationalization of the F-SAMA	
	Pannel Discussion, Q&A	Moderator	
	Rapporteurs	Weldone Mutai (ACT) and Paswell Marenya (CIMMYT)	

Parallel sessions									
Session 5									
	Venue 1		Time allocation	Venue 2		Time allocation	Venue 3		Time allocation
08h00 to 10h00	Special session: Soil Health measurements - sense and nonsense		120	Panel discussion: Scaling CA in the Context of Gender Equality and Social Inclusion (GESI)		120			
	Moderator: Prof Pieter Swanepoel			Moderator					
	Prof Karin Jacobs	Sense and Non-sense in Soil Health	30	Dr Sieglinde Snapp	Scaling CA in the context of Gender Equality and Social Inclusion (GESI)				
	Dr Ieda de Carvalho Mendes	Large-scale Assessments of Soil Health in Brazil through Soil Enzyme Analysis	30	Dr Mloza-Banda & Dr Hambulo Ngoma	CA Adoption status in Eastern & Southern Africa				
	Prof Bobbi Helgason	Successes and surprises: conservation agriculture in the Canadian Prairies	30	Dr Rachid Moussadek	Morocco green growth vision of 1 Million Hectares under CA by 2030				
	Prof Gerhard du Preez	Context Matters: What role does environmental and management factors play in promoting soil health?	30	Philip Wanjohi & El Hassane Bourarach:	AfricaMechanize platform & F-SAMA Webinars				
	Rapporteur	Prof Johann Strauss		Naufel Roudies	Low cost for high impact technologies: enhancing adoption of CA by smallholders in Africa				
				Panel discussion, Q&A					
				Rapporteurs	Sina Luchen and Philip Wanjohi				

10h00 to 10h30	Coffee Break		30						
----------------	--------------	--	----	--	--	--	--	--	--

Session 6							
10h30 to 12h00	Panel Discussion: Challenges to Small Scale Farmers		90	Slot available for side event			
	Moderator: Mr Klaas Mampholo						
	Erna Kruger	South Africa					
	Dr Kofi Boa	Ghana					
	Dr Christian Thierfelder	Zimbabwe					
	Royd Miselo	Zambia					
	Dr. Matthew Mbanga	Zimbabwe					
	Rapporteur	Dr Jaap Knot					

Session 7							
12h00 to 13h20	Promoting CA-based knowledge		80	Farm- and ecosystem level benefits			Mainstreaming of CA
	Moderator: Prof Emilio J. Gonzalez-Sanchez			Moderator: Dr Chloe MacLaren			Moderator: Prof Sue Walker
	Dr Mina Devkota, Icarda	Conservation Agriculture an option for climate adaptation and mitigation with improved crop productivity and soil health: Case study from rainfed and irrigated drylands	20	Dr Isalah Nyagumbo, CIMMYT	Conservation Agriculture can be an Effective Fall Armyworm Control Strategy in Maize-Based Cropping Systems in Southern Africa	20	Asoc Prof Stephanie Midgley, Western Cape Department Of Agriculture
	Asoc Prof Antonio Rafael Sánchez-Rodríguez, University Of Córdoba	Soil health in a cereal-oleaginous crop rotation under no tillage in a semiarid region in Spain: nutrient use efficiency and biodiversity	20	Dr Md Abdul Matin, International Maize and Wheat Improvement Center (CIMMYT)	Mitigating Labour Bottlenecks and Improving Productivity of Smallholder CA Farmers in SSA through Mechanization	20	Dr Melmangalam Ramasubramanian, National Agro Foundation
	Dr Vicky Singh, Punjab Agricultural University, Ludhiana	Integrated effect of nitrogen and crop residue management practices on terminal heat, crop production and nitrogen use efficiencies in cereal-based cropping system in South Asia	20	Mr Selebalo Joseph Ramakhanna, Agricultural Research	THE FARMERS PERCEPTIONS AND FACTORS INFLUENCING ADOPTION TO NO TILL CA AMONG BEANS AND MAIZE FARMERS IN LESOTHO	20	Prof Karim Houmy, FAO Plant Production and Protection Division
	Mr Kelvin Kalala, CIMMYT	Long-term impacts of conservation tillage practices on soil quality and maize yield in monze, southern province, Zambia.	20	Dr Johan Van Der Waals, Realipm	The Effect of Soil Organic Matter Fractions in Conservation Agriculture	20	Dr SN Theron
	Rapporteur	Dr Christian Thierfelder		Rapporteur	Dr Neal Eash		Rapporteur
							Dr Kofi Boa

13h30 to 14h20	Lunch			40
----------------	-------	--	--	----

Session 8									
14h20 to 17h00	Examples of successful CA adoption and scaling out/up		140	FARMER SESSION 1			Farm- and ecosystem level benefits		
	Moderator: Dr Enamul Haque			Moderator: Saidi Mkomwa			Moderator: Prof Stephanie Midgley		
	Dr Christian Thierfelder, CIMMYT	Unanswered Questions and Unquestioned Answers: The Challenges of Crop Residue Retention and Weed Control in Conservation Agriculture Systems of Southern Africa	20	Dr Petrus Du Toit, Econotech Farming Pty Ltd	Precision Farming Of Cattle As An Integral Part Of Conservation Farming	20	Dr John N. Landers, Febrapdp	Areas Where Conservation Agriculture Can Advance	20
	Prof Aziz Nurbekov, Fao	Effect of different crop residue rate on productivity of winter wheat yield under no-till method in salt affected regions of Uzbekistan.	20	Mr Mark Stewart, Eternal Values (PTY) Ltd	A diverse South African conservation farming journey in a nutshell	20	Dr Mohammad Esmail Asadi, Agricultural And Natural Resources Research and Education Center	Comparison the efficiency of energy consumption of Conservation Agriculture and conventional methods in wheat, rapeseed and irrigated cotton crops in Golestan Province, Iran	20
	Dr Denizart Bolonhezi, Agronomic Institute Of Campinas - Iac	Soil Health and Soybean Yield Responses to Strategic Tillage and Cover-Crops in Long Term No-Tillage	20	Miss Temakholo Mathebula, Mahlathini Development Foundation	Regenerative Agriculture in Smallholder Farming Systems in the Natal Midlands: A Case Study of Martina Xulu	20	Prof Johann Strauss, Western Cape Department Of Agriculture	Conservation Agriculture System stability under varying rainfall	20
	Dr Wei Xiong, International Maize And Wheat Improvement Center	The optimization of conservation agriculture practices requires attention to location-specific performance: evidence from large-scale gridded simulations across South Asia	20	Mr Leon Badenhorst, LenteBaden Farm	Lente Farm Regenerative dairy farm development process	20	Mr Mulundu Mwila, Zambia Agriculture Research Institute	CLIMATE SMART AGRICULTURE (CSA) FOR ENHANCED RESILIENCY AND INCREASED PRODUCTIVITY IN MAIZE SYSTEMS: UTILISING GREEN MANURE/ COVER CROPS IN EASTERN ZAMBIA.	20
	Dr Hambulo Ngoma, International Maize and Wheat Improvement Center (CIMMYT)	Understanding sustained adoption of conservation agriculture among smallholder farmers: Insights from a sentinel site in Malawi	20		Herr Klaus Keppler, Gkb e.V. Germany	Our way to no-till farming	20	Mr Julio Román-Vázquez, European Conservation Agriculture Federation (ECAf)	The role of Conservation Agriculture in enhancing biodiversity in agricultural ecosystems
	Prof Sue Walker, Agric Research Council - Soil, Climate & Water	Comparison of Conservation, Regenerative and Agro-ecological Agriculture in South Africa	20	Prof Raymond Auerbach, Centre of Excellence for Food Security	Chinese Dairy Farming in the Mongolian Desert	20	Mr Neil Miller, Canadian Foodgrains Bank	Lablab purpureus (L.) Sweet Intercropping Provides Production, Sustainability, and Environmental Benefits for Farmers in Northern Tanzania	20
	Dr Willem Hoffmann, Stellenbosch University	Profitability of sheep production in modified conservation cropping systems in the Middle Swartland	20	José Mário Lobo Ferreira	SURFACE TEMPERATURE VARIATION AS A PROXY FOR SOIL HEALTH ASSESSMENT IN CERRADO BIOME AGROECOSYSTEMS	20	Mrs Eleanor Mutsamba-Magwaza, CIMMYT	Soil Moisture Dynamics in Maize-Legume Intercropping Systems in Semi-Arid Region	20
	Rapporteur	Prof Antonio Rafael Sánchez-Rodríguez		Rapporteur	Dr. Matthew Mbanga		Rapporteur	Dr Isaiah Nyagumbo	
Free evening									

Parallel sessions									
Session 9									
	Venue 1		Time allocation	Venue 2		Time allocation	Venue 3		Time allocation
08h00 to 09h00	Panel Discussion: Future CA		60	Possible side event slot available			Possible side event slot available		
	Moderator	Chris Burgess							
	Leïth Ben Becher	Tunis							
	Prof Pieter Swanepoel	South Africa							
	Prof Gottlieb Basch	Spain							
	Dr Nele Verhulst	Mexico							
	Dr Enamul Haque	Banladesh							
	Rapporteur	Dr Amelia Genis							

Session 10									
09h10 to 10h50	Farmer session 2		60	Examples of successful CA adoption and scaling out/up		60	Promoting CA-based knowledge		60
	Moderator:Dr Jaap Knot			Moderator:Dr Vijesh Krishna			Moderator:Dr Hafiz Muminjanove		
	Mr Vikas Chaudhary, Society for Conservation of Natural Resources and Empowering Rural Youth	Role of Farmer Cooperatives in Refining and Scaling of Smart Agriculture Technologies in Haryana, India	20	Dr Chloe MacLaren, Swedish University Of Agricultural Sciences	Farm Management or the Environment: What Determines Whether Crop Diversification Works?	20	Prof Chunsheng Hu, Center For Agricultural Resources Research, Institute Of Genetics And Developmental Biology, Chinese Academy Of Sciences	Effect of mineral N fertilizer and organic input on maize yield and soil water content for assessing optimal N and irrigation rates in Central Kenya	20
	Mr Nqobile Mbokazi, Mahlathini Development Foundation	Conservation Agriculture And Livestock Integration Phumelele Hlongwane & Nothile Zondi Small-Scale Farmers, Bergville, South Africa	20	Dr Martin Harries, Department of Primary Industries Western Australia	Western Australian No-till Farmers Continue to Increase Water Use Efficiency.	20	Prof Johann Strauss, Western Cape Department Of Agriculture	Driving Conservation Agriculture adoption in the Western Cape, South Africa	20
	Mr Dirk Laas, Halfontein Farm	Participatory on-farm research to adapt conservation agriculture in the semi-arid North West Province, South Africa	20	Dr Ramin Lotfi, Dari	The status of conservation agriculture development in Iran's dryland farming system	20	Dr Brian Muroyiwa, National University Of Lesotho	Determinants of No-Till Conservation Agriculture Adoption in Maize and Bean Cultivation in Lesotho	20
	Mr Cobus Van Coller, Libanon Farm	The development of conservation agriculture systems on a farm in the arid, sandy north-western Free State, South Africa	20	Miss Talent Namatsheve, Norwegian University of Life Sciences	Synergistic effects of conservation agriculture and biochar on nitrous oxide emissions, biological N2-fixation, and soil N dynamics in three contrasting soils	20	Mr Francesco Carnevale Zampalo, Sri-2030	Compatibility between Conservation Agriculture and the System of Rice Intensification	20
	Rapporteur	Dr Hendrik Smith		Rapporteur	Dr Blessing Mhlanga		Rapporteur	Dr Josef Kienzle	

10h50 to 11h40	Coffee
----------------	--------

Session 11									
11h40 to 13h00	Farm- and ecosystem level benefits			Mainstreaming of CA			Examples of successful CA adoption and scaling out/up		
	Moderator: Dr Sjoerd Duiker			Moderator: Prof Gottlieb Basch			Moderator: Prof Jagdish Ladha		
	Dr Blessing Mhlanga, International Maize & Wheat Improvement Centre	Two crops are better than one for nutritional and economic outcomes of Zambian smallholder farms, but require more labour	20	Dr Jaap Knot, Asset Group	Benefits of Cover Crops in Commercial Maize-based Conservation Agriculture Production Systems of South Africa	20	Prof Mohamed Annabi, INRA-tunisia	Conservation Agriculture to Rebuild Soil Fertility in Northern Tunisia	20
	Dr Lindah Muzangwa, Royal Agriculture University	Evaluation of Soil Health on South African Conservation Agriculture Systems using Biofunction®: A Case Study of Ottosdal and Ladybrand.	20	Miss Boitumelo Lekgoathi, Tshwane University Of Technology	Effect of intercropping dry bean with indigenous crops on soil health under regulated deficit irrigation (RDI)	20	Asoc Prof Emilio J. Gonzalez-Sanchez, Etsiam University of Cordoba (Spain)	Harvesting Sustainable Futures: Global Perspectives on the Adoption of Conservation Agriculture	20
	Prof Tesfay Araya Weldelessie, University Of The Free State	Improving crop productivity, resilience, and sustainability through conservation agriculture systems in Eastern Cape, South Africa	20	Prof Tiago Telles	Conservation Agriculture advances and challenges in Brazil	20	Ademir Calegari, IAPAR (Agricultural Research Institute)	Conservation agriculture in a subtropical region of Brazil: soybean yield and soil health parameters after 37 years	20
	Mr Bisrat Getnet Awoke, University of Hohenheim	Evaluating Agronomic and Economic Performance of 4WT-based Mechanized Conservation Tillage Systems in Ethiopia	20	Mrs Liudmila Orlova, National Movement for Conservation Agriculture	Promoting knowledge about CA in Russia, the activities of the National Conservation Agriculture Movement	20	Dr Hendrik Smith, ASSET Research	Adoption of conservation agriculture in South Africa – from current insights and initiatives towards future needs and responses	20
	Rapporteur	Dr Samuel Anuga		Rapporteur	Prof Aziz Nurbekov		Rapporteur	Mr Lewis Hove	
13h00 to 13h40	Lunch								

Session 12									
13h40 to 16h00	Farm- and ecosystem level benefits		140	Farm- and ecosystem level benefits		140	Mainstreaming of CA		140
	Moderator: Dr Josef Kinzle			Moderator: Prof Tesfay Araya Weldelassie			Moderator: Dr Mike Wallace		
	Dr Simbarashe Jombo, Sol Plaatje University	Advancing Conservation Agriculture: Mapping Maize Areas Using Multispectral and Radar Image Analysis with a Random Forest Machine Learning Algorithm	20	Dr Sjoerd Duiker, Penn State University	Soil Health-Food Health Connection Confirmed in Conservation Agriculture	20	Asoc Prof Stephanie Midgley, Western Cape Department Of Agriculture	SmartAgri: Conservation Agriculture as a Pillar in Sub-National Climate Smart Agriculture Strategy and Implementation in the Western Cape of South Africa	20
	Dr Samuel Anuga, European University Institute	Climate-smart agriculture: Greenhouse gas mitigation in climate-smart villages of Ghana	20	Dr Md Enamul Haque, Murdoch University	Bio-physical and Social Constraints Restrict Yield and Economical Gains from Long-term Conservation Agriculture in Intensive Rice-based Systems	20	Prof Aziz Nurbekov, Fao	Economic Efficiency of Conservation Farming along with Short Crop Rotation System in Salt Affected Areas	20
	Ms Erna Kruger, Mahlathini Development Foundation	Successful adoption of a range of practices within CA in smallholder farming systems in KwaZulu Natal, South Africa leads to improved climate resilience.	20	Dr Gert Van Coller, Western Cape Department of Agriculture	Management of Fusarium Crown Rot of Wheat Through Conservation Agriculture	20	Dr Adeeth A. G. Cariappa, CIMMYT	Carbon Farming to Override the Yield-Emission Trade-Off in Punjab, India	20
	Frits van Oudtshoorn, Working on Grass	The impact of ultra-high-density-grazing on botanical composition, diversity and productivity	20	Dr Vijesh Krishna, International Maize and Wheat Improvement Center (CIMMYT)	Impact of Conservation Agriculture on Residue Burning and Air Quality in Punjab, India	20	Dr Tika Karki, Nepal Agri. Res. Council	Up-scaling of Conservation Agriculture in Nepal: Partnership between CIMMYT and NARC	20
	Dr Jaap Knot, Asset Group	A risk analyses quantifying the benefits of integrated crop-livestock CA systems	20	Dr Leonard Rusinamhodzi, Iita	Perennialism Is An Enabler of Conservation Agriculture: An Opinion	20	Miss Ananya Khurana, Gokhale Institute of Politics and Economics	Decoding the Smoke: Socioeconomic Drivers and Regulatory Strategies for Crop Residue Burning in India	20
	Dr Abir Dey, Indian Agricultural Research Institute	Impacts of conservation agriculture on quality and mineralization of soil organic matter under contrasting hydro-thermal regimes of rice-wheat system in eastern Indo-Gangetic Plains	20	Dr Neal Eash, The University of Tennessee	Can "Small" Maize Fields Sequester Carbon?	20	Dr Rachid MOUSSADEK, ICARDA	Faster the adoption of the conservation agriculture to 1 million Ha in Moroccan Drylands by 2030: Challenges and opportunities	20
	Mr Alfonso Moreno Moraga, University Of Córdoba	The effect of Rhizoglomus spp. applied as a biostimulant to durum wheat on the crop productivity and quality, when planted with direct seeding and reduced fertiliser doses	20	Dr Mohammad Esmaeil Asadi	The Effect of Conservation Agriculture on Organic Carbon Content in Arid and Semi-arid Areas: A Case Study of Rainfed Lands in Aq-Qala city, Northern Iran	20	Mr Óscar Veraz-González, Spanish Association for Conservation Agricultura Living Soils	Conservation Agriculture in the European Common Agricultural Policy (CAP): The eco-schemes in Spain.	20
	Rappoteur	Dr Martin Hamies		Rappoteur	Dr Yash Dang		Rappoteur	Dr Lindah Muzangwa	

16h00 to 16h20 Coffee

Session 13								
16h20 to 18h00	Examples of successful CA adoption and scaling out/up		100	Promoting CA-based knowledge		100	Examples of successful CA adoption and scaling out/up	100
	Moderator	Dr Nele Verhulst		Moderator	Ms Annelene Swanepoel		Moderator	Dr Leonard Rusinamhodz
	Prof Amir Kassam, University of Reading, UK	Conservation Agriculture: The Foundation for Regenerative Agriculture	20	Dr Luxon Nhamo, Warer Research Commission (wrc)	LINKING CONSERVATION AGRICULTURE TO THE 5PS OF THE SUSTAINABLE DEVELOPMENT AGENDA: A WATER-ENERGY-FOOD-ECOSYSTEM NEXUS PERSPECTIVE	20	Dr Yash Dang, The University Of Queensland	55 years of no-tillage and crop residue retention on a Vertisol in north-eastern Australia
	Mr Ernst Hendrik Smit, Western Cape Department of Agriculture	Enhancing agriculture resilience with long term crop rotation trials under Conservation Agriculture	20	Mr José Javier Guerrero-Criado, University Of Córdoba	Modeling Soil-Plant Behavior in a Wheat-Canola Rotation in the South of Spain: A New Approach from Digitization and Conservation Agriculture	20	Prof HAITHEM BAHRI, National Research Institute for Rural Engineering, Water, and Forestry	Study on crop rotation management under conservation agriculture in Tunisia: A crop modelling approach
	Dr Denizart Bolonhezi, Agronomic Institute Of Campinas - Iac	How to Improve the Soybean Grain Yield and Root System in a Long-Term Trial of No-tillage under Sugarcane Straw ?	20	Dr Kamaluddin Tijjani, CIMMYT	Does soil native supply of nutrients depend on all the three principles of conservation agriculture?	20	Dr Hatem Cheikh M'hamed, National Institute for Agricultural Research of Tunisia	Crop Livestock Integration for Rapid Adoption of Conservation Agriculture in North Africa: Case of Tunisia

16h20 - 18h00	Dr John N. Landers, Febrapdp	Zero Tillage Planting into a Permanent Tropical Legume Sward - The Next Revolution in Conservation Agriculture	20	Dr Jana Epperlein, GKB e.V.	„Supporting adoption of Conservation Agriculture in Europe – first experiences with a farmer-based movement in German speaking European countries"	20	Prof Aziz Nurbekov, Fao	Short Crop Rotation under No-till Improves Crop Productivity and Soil Quality in Salt Affected Areas	20
	Prof Jagdish Ladha, University Of California, Davis	The Journey of Conservation Agriculture in South Asia: From the Rice-Wheat Consortium to the Cereal System Initiative for South Asia	20	Asoc Prof Emilio J. Gonzalez-Sanchez	Worldwide trends in Conservation Agriculture and climate change scientific production	20	Dr Dhanyalekshmi Pillai, Indian Institute Of Science Education And Research Bhopal	Accurate detection of Zero-Tillage Practice in Smallholder Systems using Multi-Spectral Imagery	20
	Rappoteur	Prof Raymond Auerbach		Rappoteur	Dr Rachid MOUSSADEK		Rappoteur	Mr Selebalo Joseph Ramakhanna	

19h30	Gala Dinner								
	Awards for talks and poster								
	Congress Declaration								
	Announcing 10th WCCA host								

Field day		Viewings for the day	
07h00	Depart to Langgewens Research Farm		Soil health and production in 4 soil disturbance regimes
08h30 - 09h30	Arrive body break/coffee		Grazing strategies
09h30 to 09h45	Welcome		Long-term CA trial
09h45 to 10h00	Move to first point		Soil pits
10h00 to 14h00	Trials and exhibitions		Planters - local manufacturers
14h00 to 15h00	South African Braai		Local farmers sharing their experiences about their rotation systems
16h00	Travel back to Cape Town		Tech exhibition - drones and agriculture

Main author	Title
Prof Thomas Weyer	30 years of conservation agriculture at the agricultural teaching and testing institute Merklingsen (Germany), effects on soil functions
Miss Mamotshabo Rakgwale	A Comparison of Arthropod-mediated Ecosystem Services between Annual and Perennial Cropping systems in the Central Free State, South Africa
Dr Gabriel Vusanimuzi Nkomo	A Review of CA adoption and learnings from conservation agriculture efforts in Zimbabwe
Mr Gerard Rass	Adoption of Conservation Agriculture at Local Level : a Guide for Developers Made by Farmers
Dr Hintsa Araya	ADOPTION OF SELF-REGULATING, LOW-ENERGY, CLAY-BASED IRRIGATION (SLEC) SYSTEMS TO SAVE WATER AND IMPROVE CROP PERFORMANCE BY SMALLHOLDER FARMERS
Dr Debashis Chakraborty	Advisory for Stakeholders: Adoption of Conservation Agriculture with the Right Combinations of Techniques and Niches
Dr Brian Muroyiwa	Agricultural finance and extension services for smallholder maize farmers practising CA in Lesotho- Determinants of adopters and non-adopters access to finance and extension services.
Mr Hafiz Mujeebur Rehman	Assessment And Implementation Strategy For Adoption Of Conservation Agriculture For Improving Livelihood Of Vulnerable Peasant Communities In Sindh, Pakistan
Mr Antonio M. Conde-López	Best Management Practices implemented in annual crops mitigate climate change
Miss Robin Riet	Canola (Brassica napus L.) cultivar, plant density and herbicide use effect on weed suppression
Dr Rosa Carbonell-Bojollo	Carbon farming as a mean to mitigate the impacts of climate: The LIFE Agromitiga Project.
Mr AL Moutmir Al Moutmir	Carbon Sequestration Potential of No-Till Wheat Cultivation in Moroccan Provinces: A Case Study of the Al Moutmir not till program
Mr Andries Le Roux	Climate Change Impacts on Canola Growth and Yield Characteristics: Challenges and Opportunities
Mr Amon Chirchir	Combating Animal Mortality And Preserving Plant Life
Mrs Thembisile Mapumulo	Commercializing homestead amadumbe production: A case study of assessing sustainability of an agronomic traditional system in Umbumbulu KwaZulu Natal
Miss Mary Maluleke	Comparing the Financial Benefits of Different Grain Farming Systems in South Africa
Dr Deepak Deepak	Conservation Agriculture based Sustainable Intensification Options in Cereal Systems to Improve Profitability, Resource Use Efficiency in EIGP of India
Prof Regis Chikowo	Conservation agriculture enhanced by better targeting of resources driven by policy in Zimbabwe
Mr Clive Kudzai Govah	CONSERVATION AGRICULTURE FOR REGENERATING SOIL HEALTH AND CLIMATE VARIABILITY IN SMALLHOLDER SYSTEMS OF ZIMBABWE.
Mr Frans Joseph	CONTROLLING GULLY EROSION IN THE FREE STATE PROVINCE USING LOW-COST SOIL CONSERVATION TECHNIQUE
Dr Willem Hoffmann	Coping Strategies for Lower Rainfall Scenarios on Winter Cereal Production Systems in the Swartland, Western Cape
Dr Tannishtha Bardhan	Decoding Behavioural Drivers Impacting the Adoption of Conservation Agriculture by the Farmers in Indo-Gangetic Plains
Mrs Connie Madembo	Demystifying The Intermediating Role of Conservation Agriculture on Resource Pool Diversity and Weed-crop Competition in Maize-Based Farm Ecosystems
Dr Brian Muroyiwa	Determinants of Conservation Agriculture Adoption and Farmers Perceptions of Effects of its Adoption on Maize and Beans Yield in Lesotho
Dr Denizart Bolonhezi	Direct Transplanting of Pre-Sprouted Sugarcane Seedlings under Straw of Soybean and Cover Crop: Impact on Yield and Soil Organic Carbon
Mr Ittai Warburg	Earthworm species diversity from two vineyards in Northern Israel
Dr Manuel Moreno-García	Effects of no tillage on soil nematode populations in cereal crops in Spain
Mrs Noluthando Aruwajoye	Enhancing Mineral Nitrogen and Extractable Phosphorus through Vermicomposting Paper and Blood Meal Mixtures with Added Winery Waste.
Mr Love Kumar Singh	Enhancing Nutritional Security in Indo-Gangetic Plains through Sustainable Agri-Food Systems

MD Lydia Nakupanda	Enhancing productivity through agroecological principles toward tackling climate change.
Mr Hafiz Mujeebur Rehman	Enhancing The Water And Yield Productivity of Rice Crop Through Innovative Rice Planting Technologies In The Punjab, Pakistan
Mr Pacsu Simwaka	Enhancing Use of Sustainable Tillage Systems under Conservation Agriculture in Malawi
Dr Bonginkosi Vilakazi	Enzyme activity under different tillage techniques and N fertilizer management in dry land agriculture.
Miss Ngeletshedzo Makhaga	Evaluating the effect of knowledge transfer on the adoption of Conservation Agriculture in OR Tambo District
Dr Idah Mbengo	Exploring Smallholder Farmers' Adoption of Conservation Agriculture in Eastern Cape, South Africa
Miss Morgan Lee	Exploring sustainable agricultural transitions in South Africa's commercial grain sector
Dr Siviwe Shwababa	Exploring the impact of extreme weather events on agricultural production
Mr Sibongiseni Peacock	Exploring the smallholder farmer's perception towards grass biodiversity conservation in uMzimkhulu Local Municipality, KwaZulu-Nata Province
Dr Brian Muroyiwa	FACTORS INFLUENCING CHOICE OF MAIZE AND BEANS MARKETING CHANNELS FOR SMALLHOLDER FARMERS IN LESOTHO: THE CASE OF CA AND CONVENTIONAL FARMERS
Mr Kent Buchanan	Growing Resilience in Agriculture: Evaluating the Relevancy of Long-Term Conservation Agriculture in South Africa
Prof Denis Topa	Impact of conservation tillage system on soil properties assessed by X-ray computed tomography (CT) and portable X-ray fluorescence spectroscopy (XRF)
Mrs Betty Rutendo Masamba	Impact of Cropping Systems on Weed Community Dynamics under Conservation Agriculture in sub-humid Zimbabwe.
Mr Themba Kumwenda	IMPACT OF SUSTAINABLE LAND MANAGEMENT PRACTICES ON CROP PRODUCTIVITY AND FOOD SECURITY AMONG SMALLHOLDER FARMERS IN SHIRE RIVER CATCHMENT
Mr Selebalo Joseph Ramakhanna	IMPACTS OF MAIZE AND BEANS MARKETING FOR SMALLHOLDER FARMERS IN LESOTHO: THE CASE OF CA AND CONVENTIONAL FARMERS
Dr Lynn Katsoulis	Improving Crop Pollination by Providing Nesting Resources to Boost the Populations of Crop-Specific Solitary Bees
Dr Nadia Araya	Improving the Productivity of Leafy Vegetables Grown under Rainwater Harvesting and Conservation Techniques in a Semi-arid Area of South Africa
Mr Mulundu Mwila	Increasing options for optimizing surface residue retention in Conservation Agriculture through doubled-up legumes in eastern Zambia
Mr Mongalo Makubu	Investigating adoption of Information Communication Technology (ICT) tools by small-scale farmers in Blouberg Local Municipality Limpopo Province.
Miss Catalina Rico Lenta	Local Sustainable Management Practices Fostering Biodiversity among Family Farmers in Argentinian Patagonia
Mr Nariman Nishanov	Looking at the Economic Efficiency of Conservation Agriculture Practices: Case of Uzbekistan
Mr Joe Collins	Lower yield is balanced by lower input costs in a systems-level evaluation of conservation agriculture net profit: some early results.
Mrs Telma Sibanda	Mechanised conservation agriculture as part of agroecology transition in smallholder systems in Zimbabwe
Mr Antonio M. Conde-López	Methodology to quantify energy consumption in annuals and permanent crops production
Dr Derian ECHEVERRI	Monocropping vs Crop rotation. Risk scenarios in South African commercial forestry
Miss Lehlogonolo Seale	Nematode resistance of tillage radish to Meloidogyne incognita under greenhouse conditions
Dr Miguel A. Repullo-Ruibérriz de Torres	No tillage contribution to climate change mitigation. Emissions balance in a cereal field with different fertilisation and irrigation strategies
Dr Denizart Bolonhezi	No-tillage for Sugarcane-Peanut Crop Rotation System
Dr Stephano Haarhoff	Nutrient Management for Grain and Oilseed Crops In The Summer Rainfall Region Of South Africa
Dr Mina Devkota	Opportunities, challenges, and future outlook of Conservation Agriculture in the Middle East and North Africa

Mr Mxolisi Mtyobile	PERFORMANCE OF MAIZE VARIETIES UNDER MINIMUM TILLAGE IN SEMI-ARID CONDITION OF O.R TAMBO DISTRICT, SOUTH AFRICA
Dr Siyabusa Mkuhlani	Prediction of maize yields under conservation agriculture cropping systems using crop and machine learning models in Eastern Southern Africa
DrKatiaGobbi	PRODUCTIVITY OF CASSAVA GROWN ON PALISADE GRASS STRAW IN AN INTEGRATED CROP-LIVESTOCK SYSTEM
Pro fAziz Nurbekov	Restoration Efficiency of Glycyrrhiza Glabra L. in Abandoned Saline Areas of the Aral Sea Region
Miss Jade Andrews	Rooting For Resilience: Cultivating Prosperity Through Conservation Agriculture in South African Vegetable Soils
Dr Rosa Carbonell-Bojollo	Soil management practices in annual crops for climate change mitigation.
Prof Raymond Auerbach	South African Conservation Dairy Farming and the Tigerkloof Experiment
Dr Paidamoyo Mataranyika	Strategies to improve conservation agriculture using bacteria-based bio-fertilisers isolated from drought-tolerant legumes
Mrs Connie Madembo	Strip cropping systems improve soil fertility, productivity, and nutritional yield of small-scale maize farmers in Zimbabwe
Dr .Miguel A. Repullo-Ruibérriz de Torres	Sustainable systems based on Conservation Agriculture for cost saving in Western Europe
Prof Cornie Van Huyssteen	The effect of Trichderma asperellum on fodder yield in the southern Cape
Dr Brian Muroyiwa	THE FACTORS INFLUENCING ADOPTION OF NO TILL CONSERVATION AGRICULTURE AMONG BEANS AND MAIZE FARMERS IN LESOTHO
Mrs Elani Heyneke	The Importance of Understanding Mesoscale Weather Features to Assist Conservation Agriculture Practises in South Africa: A Case Study
Miss Hanneke Augustyn	The Nitrogen Availability in Soil Following Legume Crops and Their Effect on the Subsequent Crop
Prof Cornie Van Huyssteen	The role of water saturation in conservation agriculture
Mr Ernest Adu	Training and Curriculum Development for Conservation Agriculture in the Northern Savannahs of Ghana
Miss Huibrecht Schreuder	Utilisation of host resistance to manage blackleg of canola in South Africa
Dr Roberto Branco	Winter cover crops for ecological weed management in vegetable production under Conservation Agriculture



BLWK Bestuurspan/CAWC Management Team **Lede**

MG Lötter – devlei@whalemail.co.za
 Sakkie Rust – sakkie@rautenbachtransport.co.za
 Danie Rossouw – vryguns@new.co.za
 Drikus Mouton – drikus.mouton@gmail.com
 Floris Steenkamp – floris@dutoit.com
 Hume Schonfeldt – humeschonfeldt@gmail.com
 Leon Badenhorst – lentebaden@whalemail.co.za
 Amelia Genis – agenis@landbou.com
 Charl van Rooyen – charl.vanrooyen@westerncape.gov.za
 Pieter Blom – pblom@ssk.co.za
 Rens Smit – rens.smit@westerncape.gov.za
 Johann Strauss – johann.strauss@westerncape.gov.za
 Ivan Jansen van Rensburg – ijvr@barenbrugsa.co.za
 Zander Spamer – Zander@soill.co.za
 Ruben Badenhorst – rubenb@overbergagri.co.za

Landbou weekblad

Click on the email address
to send a person an email

