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# Nufarm Investor Day – Nuseed & Omega-3 Canola

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**Andy Thomas – GM Portfolio and Strategy, Nuseed**

Good morning everyone, welcome.

These are exciting times for Nuseed.

We are developing entirely new plant-based solutions which are about more than just improving plant yields. At Nuseed we refer to this approach as our “Beyond Yield” strategy.

Today we will provide you with greater insight into one of our most important ‘Beyond Yield’ technology platforms – omega-3 canola.

But first, I would like to touch on some other developments in the broader Nuseed portfolio that are generating some valuable opportunities for the company.

Nuseed’s current core seeds business, the global development and distribution of high yielding sunflower, sorghum and canola, is rapidly expanding into new regions.

Our R&D teams - using leading molecular capabilities, global genetics and industry collaboration - are developing unique Beyond Yield “output” plant traits for novel oils and proteins, with specific customer and consumer benefits.

Nuseed is creating new value by fundamentally changing the crop’s end-use and entering into global strategic alliances, to access new and higher value markets.

Today, the majority of end-use markets for agriculture are commodity focused and therefore stop seed innovation focus at the farm gate. Input traits delivering agronomic and grower benefits for top performing hybrids are a requirement to being successful in today’s existing markets.

However, Nuseed goes further, and also focuses on delivery of value beyond the local farm gate through development, testing and application of our technologies with downstream markets.

Our Beyond Yield™ approach positions Nuseed in completely new market segments, including aquaculture and nutraceuticals. These segments have the potential to generate significantly more value for Nuseed and give us a competitive advantage over commodity seed players.

Together with Andy Thomas, our GM of Portfolio and Strategy, I will get into more detail on the omega-3 platform and production in just a few minutes. Omega-3 stands to be our most significant example of creating new value from seed technologies.

Before we get into specific detail on our omega-3 canola program I’m going to provide a quick update on advances we’ve already made on the novel oils and proteins front – where we generate value for Nuseed at both the farm gate, and from downstream customers.

- In 2017 we launched a new market category with Onyx premium confection sunflower hybrids. The hybrid yield advantage and uniform production of unique large kernels with all-black shells is appealing to European roasters and consumers. 2017 production sold out and a plan for increased production is already underway.
- Our XXL extra-large kernel sunflower hybrids are another newly launched category capitalizing on increasing consumer demand for convenient, non-GMO plant-based sources

of protein.

- And our Monola® canola contract program continues year over year to provide growers, processors and end use customers with a unique healthy oil and value-added opportunity in Australia.

While our Beyond Yield strategy for R&D is focused on our three core crops – canola, sunflower and sorghum, Nuseed’s distribution and sales front expands to complimentary crops and strategic collaborations that help accelerate the growth of our global footprint.

In February, we announced a new relationship with Canadian agriculture technology company Agrisoma Biosciences Inc. to further develop and support the commercialisation of carinata seed and its resulting novel oil and protein. Carinata oil can be used as an advanced biojet fuel, and the meal contains very attractive levels of protein for animal feed. Earlier this year, Qantas completed its first transpacific flight powered by biojet fuel made from carinata developed by Agrisoma. While assisting with Agrisoma’s pre-commercial phase in Australia, we are already supporting growth and distribution in South America in 2018. Agrisoma expects 15-20 thousand acres to be planted in the next several months in Uruguay.

As another example, our market leading canola platform in Australia is helping us to establish valuable positions in South and North America. We are now at the precommercial phase of expansion into Canada, the world’s largest canola market, and in advanced negotiations on an exciting canola collaboration arrangement. We have also recently signed a technology license with Monsanto to utilize their TruFlex Roundup Ready trait in Canada.

To support both our core seeds business and Beyond Yield programs we are also finalizing plans for a new, state of the art Nuseed Innovation Center in California where we can bring together our molecular trait development, plant breeding, production, and novel oil and protein capabilities.

This new center will complement our existing Innovation Center in Horsham, here in Victoria, and our global breeding stations.

Turning now to omega-3 canola, our objective today is to provide an overview of our business model, our trait technology and our target markets.

Firstly, it is important to understand that the product which results from our omega-3 canola program is **oil** that is sold to downstream customers such as aquafeed producers and nutraceutical manufacturers. The value of the project is established at the point of the oil sale. That value is enabled by the technology, IP, plant breeding, supply chain coordination, and direct end use customer engagement encompassed in the program.

We will operate within a fully closed loop system for this product. We will continue to expand this system from its current base, providing seeds to selected growers who can meet our high supply chain and stewardship standards. They will grow the crop for us and harvest the grain, delivering it to storage facilities of choice. The grain will then be transported to selected best-in-class processing partners who will provide us with oil for shipment to our end use customers.

We will utilize our best canola genetics, seed and on farm experience to manage this supply chain and our business model has been designed to meet our customers’ needs including quality, sustainability and traceability standards which work for different markets and channels.

The “omega-3” market is comprised of different products, supplying long-chain and short-chain omega-3 compounds.

Short chain omega-3s, like ALA, are contained in flaxseed, canola, and other grains. Long chain – known as DHA, EPA and DPA - are those omega-3s found in fish oils.

Both are important for human and animal health, although the long chain play a more significant role in health outcomes.

Whilst long chain omega-3 is typically consumed through fish oil, these fatty acids do not originate in the fish. They are made in microalgae, microscopic ocean plants, and are concentrated in the aquatic food chain to reach high levels in wild caught oily fish. The fish is the middle man.

Our omega-3 program combines selected genes from these microalgae with canola to enable the land-based plant production of a canola crop with meaningful amounts of DHA, EPA and/or DPA.

Ratios of these omega-3s vary based on the application of the trait technology in the plant, and whilst we have a suite of opportunities in this space, we have chosen to focus our first omega-3 product on delivering a high amount of DHA.

So why DHA? Nuseed and our partners - CSIRO and GRDC - deliberately focused on producing DHA rather than easier targets such as EPA because it is found in all cell membranes and is therefore the most important of the omega-3s. It is also in the shortest supply, since humans and animals cannot efficiently convert shorter chain omega-3s into the longest-chain versions. Without DHA, normal growth and development can be impaired, and vulnerability to a number of diseases can increase. In humans, DHA is especially critical for brain, heart and eye function. In fish, it is believed to play a significant role in skin and gut health, along with stimulation of an immune response.

Consistently producing an oil rich in DHA is difficult to achieve technically and helps to underpin the value of our first product to market.

I'll now hand over to Andy to discuss the omega-3 market in general and update you on our progress towards commercialisation.

Thanks Brent.

The market for omega-3 today is supplied mainly by fish oil from wild caught fisheries. Demand is driven by two major end-markets— aquafeed and direct human consumption. There is a long term growing demand for the long-chain omega-3 compounds in both Aquafeed and human nutrition applications, which is complicated by a shortage of supply.

The supply of fish oil is limited to a long term average availability of approximately 900,000 tons per year due to quotas to prevent overfishing and negative effects on the ocean food chain. Given the increasing demand for omega-3 oil, a significant deficit in supply is forecast if alternative sources to fish oil are not available.

Various projections have the overall demand for fish oil forecast to increase at between 4 and 7% CAGR over the next 20 years. These demand profiles are shown on the graph. The major consumer of this volume is Aquafeed, in particular in salmon and trout, whilst the highest value component of the demand is in direct human consumption in food, nutraceuticals and pharma applications.

The global omega-3 oil market is projected to be worth some 3.2 billion US dollars by 2023.

All downstream users of fish oil are aware of the long-term deficit projection and are actively seeking sustainable and scalable solutions. Moving to a land-based, plant source provides a much-needed alternative and reliable supply.

The range of demand outlooks presented here generally reflect expanded use in current applications. As a secure and scalable source of Omega-3 is introduced adoption of the product for applications in markets not currently using fish oil can be expected in particular in intensive animal

production industries where Long chain omega-3 offers potential value both in productivity but also output quality.

The scientific sophistication required to deliver this project is truly world leading and the project partners – CSIRO, GRDC and ourselves – are proud of the technical capabilities which have allowed us to continue to meet key milestones, timelines and objectives.

Over our approximate eight-year involvement in this project, we have consistently met all key project milestones. And we have adopted an agile approach which has compressed development timelines without compromising the project.

We have produced a stable and efficient trait in canola that is currently delivering between 10 and 12 percent long-chain Omega 3 in oil, with the majority as DHA. Additionally, our product contains a high level of ALA, the short chain omega-3

The trait is stable over multiple environments, and across canola genetic backgrounds. This is important as it allows us to incorporate the trait, via traditional breeding programs, in newer, better performing varieties of canola suited to particular local growing conditions.

As well as having achieved stability, we have seen the DHA and total long chain omega-3 content of our oil improve as we continue breeding over multiple generations. This is not always the case in the development of complex traits.

Our canola breeders are well advanced with accelerated programs to move this trait into our elite germplasm which will rapidly drive further improvement in our yield and agronomic package from the first generation launch product.

Of course, some of the most critical milestones relate to regulatory approvals. In February of this year, Nuseed secured the world's first regulatory approval for a plant-based source of long chain omega-3s.

Food uses of our omega-3 canola have been reviewed by Food Standards Australia New Zealand (FSANZ), with approval granted for sale and use in food in Australia and New Zealand. The Office of Gene Technology Regulator (OGTR) has also approved our omega-3 canola for cultivation in Australia and use in animal feed.

We expect additional oil use approvals in other countries by 2019-2020 opening access to a number of high priority markets, followed by an extensive wave of additional market approvals in 2021-2023 as you can see by the map.

The Australian approval acts as a precursor for other global filings for regulatory approval for import and use of oil or grain. In particular, China and Japan require an approval for cultivation to be in place in a reference country such as Australia before they will review submissions for import to the local market. We are now underway with those processes.

We are advancing through the regulatory process in the USA and Canada, which are key target markets. The North American market is the largest and highest value consumer of Omega-3 supplements and fortified foods. The relevant regulator in the US is the FDA for human consumption and animal feed uses. In Canada, human consumption and animal feed use approvals are managed by Health Canada and the Canadian Food Inspection Agency. We submitted to both regulators in 2017 and anticipate approval for both feed and food uses in both countries in 2019.

The US and Canada also form important parts of our supply planning. The Canadian canola plantings annually are ~10M ha whilst the US plants around 1.M ha. Approval for cultivation in the US is managed by the USDA. Our submission has progressed through the first round of public comment. In Canada, the regulatory framework for cultivation is led by CFIA. We anticipate holding regulatory

approval for these two production countries in time for our first commercial planting in mid-2019. When considered along with Australia, which produces ~2Mha pa, this will secure our base of supply, providing options on where and when we produce the grain.

Even as we continue to advance our regulatory packages for production and consumption prior to our commercial launch in 2019 – we are continuing activity aimed at proving up our stewardship programs and supply chain platforms and testing our product with downstream partners. These are critical aspects of the project.

The US regulatory system allows for production of GM crops under notification prior to their formal approval for cultivation. This work is conducted under strict stewardship protocols, overseen and audited by the USDA.

In the 2017 season, Nuseed managed ~3000ac of field work in Washington state under notification. The objective of this work was to produce a significant volume of grain, for conversion to oil for market testing in a range of applications. The production at scale also afforded the opportunity for us to engage our supply chain partners from farm supply to finished oil logistics. The work was successful with oil production quantities and quality in line with our expectations moving smoothly through the supply chain to our future customers for testing.

We have secured approval under the USDA notification process to expand this area to ~15000 acres in the current growing season. 22 individual farmers have been contracted, trained in stewardship and are in the process of planting this month. This will incrementally expand our available product for customer engagement ahead of our market entry in 2019.

The primary focus of that customer engagement is in the aquafeed market.

As I pointed out earlier, Aquafeed is the single largest market for long-chain omega-3. It currently represents about two thirds of the consumption of existing fish oil supplies and is our initial target for market entry.

It's important to understand that omega-3 in aquafeed is important for the health benefits of end consumers when they eat farmed fish.... but it is also critical for the development, growth and health of the fish itself.

We will have a branded entry into this market for our oil under the name Aquaterra™

The aquaculture industry is the fastest growing animal protein industry globally and is projected to continue to grow in importance as a sustainable contributor to human nutrition. Our initial focus is on the salmon and trout feed sub-segment which accounts for 75% of the omega-3 demand in this market. Salmon demand is currently rampant. According to a recent Undercurrent News report, fourth-quarter demand in China rose 38% year-on-year, while US demand grew 18.5% over the same period. Rabobank analyst Gorjan Nikolik has estimated that an additional 1.4 million metric tons of salmon production will be required by 2028, on top of the 2.3 million metric tons farmed today.

As fish oil supply has tightened and prices have increased, the industry has been moving to reduce the amount of fish oil in rations, replacing some of this oil with canola oil. This has been effective in extending the use of available fish oil but the inclusion rates for fish oil in aquaculture rations have now reached the minimum and cannot be cut further without a replacement source of long chain omega-3.

We have been working with the leading global and regional fish farms and feed manufacturers to collaboratively develop the commercial application of Aquaterra. We are targeting high quality companies committed to sustainability and who will lead other industry players in the adoption of our product. Our current industry discussions cover over 80% of the global market for salmon and trout farming and feed production.

Our focus at the customer level is to enable quick adoption of Aquaterra™ through customer testing in existing feed manufacturer and fish farm systems. Discussions with customers are well advanced and we will conduct joint trial work over the course of this year that will underpin our commercial launch with these customers in 2019.

At a functional level the value position for Aquaterra is in the combination of long chain omega-3 that it provides, the canola oil which it replaces in the current ration, the high ALA content in the oil, and its contribution to sustainability goals.

One of Europe's largest institutes for applied research in the fields of aquaculture and fisheries – Nofima - has carried out independent feeding studies with our omega-3 oil replacing fish oil in aquaculture rations.

The researchers found Aquaterra performed as well as fish oil in terms of both fish health and growth. Importantly, the salmon that received Aquaterra also had excellent absorption of all omega-3s into the fillet. In addition to these performance measures, Nofima showed excellent results on final product quality tests in terms of fillet and skin colour.

This research confirms for the industry that Aquaterra will be an important new source of long chain omega-3, particularly as aquaculture seeks to meet its growth objectives over the next 5-10 years.

Nuseed is also conducting its own proprietary research to advance the understanding of the functionality of DHA. There is a view in the aquaculture industry that DHA has benefits in fish health and performance, but limited data to quantify those benefits. This research will be delivered early in 2019 and will bolster the work being conducted with customers.

Furthermore, the high ALA content in our oil reverses a trend toward lower total omega-3 in the feed, a concern for the industry because it can lead to health issues for fish.

The industry also places value on surety of supply, given the volatility in fish oil. They are looking to adopt our product not as a straight replacement for fish oil but as a consistent part of the ration, not subject to the vagaries of the wild fishery.

Aquaculture is already amongst the most sustainable animal protein production systems (ref World Bank doc 78823), The sector is sophisticated technically and commercially, recognizes the limitations to industry growth that long chain omega-3 availability poses, and has a strong industry approach to sustainability.

To this end, the largest salmon farmers in the world formed the Global Salmon Initiative with a commitment to social responsibility and advancing environmental and economic sustainability goals. The GSI member farms pledged to achieve certification under the Aquaculture Stewardship Council standard which considers all aspects of the industry including a focus on traceability of feed ingredients back to sources that meet sustainability thresholds. As one of their first priorities, the Global Salmon Initiative issued a tender calling for new sources of long-chain omega-3.

While performance is a minimum requirement for all new feed ingredients, there is additional value in Aquaterra in the way the product enables the industry's sustainability goals. The fish-in: fish-out ratio is a measure used by retailers and consumers to ensure wild caught fish are not overused in the feed for farmed fish and our product delivers a valuable reduction in this key metric.

The canola base crop which underpins our supply chain also has an excellent sustainability profile. Sustainability is an increasingly important consideration driving commercial decisions in all of the industries we will serve. Operating in a land-based plant system allows us to draw on crop sector information like the recent work commissioned in Australia which documents the excellent greenhouse gas efficiency of the crop.

With the rapidly rising demand for long chain omega-3, and projected deficit in supply, there are a number of technologies which are being developed to address this opportunity.

Nuseed's omega-3 canola will be assessed against both a range of traditional fish oil-based sources of long chain omega-3s, as well as sources based on other technologies.

Our oil, derived from plants, draws on the long standing agricultural efficiencies of the canola cropping sector across multiple geographies to deliver reliable, scalable supply with a good cost of goods position. Decisions to increase supply are not subject to quotas or large scale infrastructure investment requirements which impact the alternative fish-oil and algal sources respectively.

The oil we will supply has all the physical characteristics of canola oil, an ingredient well understood through long-term use by our customers.

Algal production is energy intensive and algal biomass, the most cost-effective product form from algal sources, is both more expensive and a quite different format to current products requiring changes in the feed production systems in place with our customers.

Algal oil does have a strong position in some smaller but high value niche applications such as the infant formula segment of the human consumption market where it's cost is more easily absorbed.

And I have outlined the extremely strong sustainability credentials of our platform.

Three major elements drive our COG position in comparison to canola oil which currently trades between 800 USD and 900USD per tonne: The Stewardship and Identity preservation cost, the on-farm growing costs and the scaling of our supply chain. All three of these COG drivers improve with scale.

Our business model is driven by oil produced in an identity preserved supply chain with a high degree of stewardship. This extends through the on-farm growing and storage of the crop, grain logistics to identity preserved crushing and oil shipment. Whilst we fully anticipate that the unit cost of these activities will decline as we move to scale, there will remain ongoing incremental costs over those involved in producing a commodity crop. We will pay a premium – over commodity canola - to our supply chain partners in omega-3 canola. This premium is ongoing and an important component of an effective closed loop production chain.

Pending approval in other markets, there will be heightened requirements around stewardship. This will extend to seed production, crop production and crush. This high-level stewardship ensures both the quality of our product and the quality of other commodity exports. We are very comfortable with our stewardship plans and execution, but they do add to the costs of production in the early years of commercialization.

**Our on-farm or growing costs** are linked to agronomic performance and we will see incremental improvement in agronomic performance as the trait is deployed in more elite genetic backgrounds adapted for chosen production environments. Whilst the starting seed product being used in the field at launch is acceptable, we have conversions of the trait to improved backgrounds well advanced and will incrementally bring those products into our supply chain, reducing the cost base of production.

We expect to deliver crop industry average yields - which vary by location but typically average around 1.5MT per ha at 42% oil - within three years of launch.

**With respect to Supply chain scale up**, our ability to select individual crush plant partners in appropriate locations and with equipment that fits our needs are a strategic asset for the Nuseed business model. As we ramp up through launch, the benefits of scale at the grower, crush and logistics level will continue to improve our COG position.

We expect to reap the majority of the benefits of scale to our cost of goods incrementally over the first four years of commercialisation.

We expect to move from first revenue in FY 2019 to a positive EBITDA contribution in FY 2021.

As with the rest of Nufarm's business, we don't propose to provide detailed short-term forecasts, but looking out to 2028, 10 years post launch, we can provide further insight to the potential value of the platform:

At that point, we conservatively estimate a deficit in supply of 850,000MT of fish oil.

Nuseed will pursue as much share of that deficit as possible.

Each point of market share of that short-fall in oil is expected to generate approximately \$8.5 million of EBITDA to our business once we are at scale.

Each point of market share will require approximately 22,000 hectares of grain production in our fully optimised supply chain.

We have focused this discussion on the first product from our Omega 3 platform – Aquaterra - and it's opportunity in aquaculture.

Our first DHA rich omega-3 oil also has significant application in direct human consumption markets of fortified food, nutraceuticals and pharmaceuticals. Whilst smaller in volume, these segments are high value, and leverage product from the same Nuseed supply chain. The use of product from a clean, plant-based agricultural supply chain has recognized customer and consumer benefits over fish oil in all direct human consumption uses.

We have commenced clinical trial work in North America to further demonstrate safety and effectiveness and to clinically support our marketing claims strengthening our entry into the largest supplement and fortified food markets in the world with a product we have called Nutriterra.

The ease of producing oil for incorporation into dietary supplements and food products with the DHA rich profile of Nutriterra are benefits in both the nutraceutical and fortified foods sectors. The dreaded "fishy burp" associated with many fish oil capsules affect a large percentage of nutraceutical capsule users. Nutriterra's holistic essential nutrients deliver a truly scalable and accessible solution for long-chain and short chain omega-3's. Whilst this segment of the market is a smaller consumer of fish oil in gross volume, it generates a premium over the price of fish oil used in Aquaculture.

The platform we have developed does not stop at these first DHA rich products, but is followed in the product pipeline by options in other omega-3 fatty acids (DPA and EPA) and improved second generation DHA products already in development.

I'll now hand back to Brent to update you on our intellectual property estate and provide some concluding comments.

Thanks Andy.

A critical component of our innovation strategy includes the implementation of intellectual property strategies that ensure freedom to operate, and protect our technology and competitive advantage. These IP strategies include the use of trade secrets, trademarks, proprietary hybrid systems and germplasm, and patents.

The omega-3 project is an excellent example of where we have successfully secured a strong and layered patent estate that protects the proprietary nature of that program.

Our Omega-3 investment represents a suite of technologies developed with our partners CSIRO and GRDC. We broadly describe the IP estate in 6 families.

- 2005 family: relates to gene functions, compositions, enzyme activity and compositions
- 2009, 2012, 2013, and 2014 families relate to inventions in the efficiency of omega 3 pathways, oil compositions, enzymes, oil structure, extraction, and uses of the oil.
- 2016 patents relate to our first product referred to as our “elite event” for high DHA production in plants, plant cells, and unique genetic sequence

In total, these families now represent over 60 granted patents, with over 90 pending world-wide.

Any competitive player in a plant-based omega-3 platform will likely require a license from Nuseed and partners to cultivate, extract, or sell resulting oil in any key market in the world.

This estate continues to evolve. Within the past 4 months we have achieved grant and allowance of 10 more patents that further strengthen our IP position.

BASF holds a single patent in Australia that we continue to assess. We have options in terms of either challenging the validity of that patent; considering possible licensing arrangements with BASF; or simply waiting for the patent in question to expire in 2025 before commencing commercial activities in Australia.

To summarize, we have absolute confidence in our commercial pathway and freedom to cultivate in North America, the world’s largest canola market. We have a clear pathway to sell the resulting oil to all of the largest and key downstream markets, and we are completely committed to defending the value of our IP estate and our technology.

It truly is an exciting time for our business. Our core seed business is growing, and continuing to become more differentiated. Our capabilities and partnerships are enabling new Beyond Yield opportunities. The omega-3 platform has achieved world-class science and regulatory milestones. The downstream customers are excited and engaged in its adoption, and are working hand in hand with us to validate the unique benefits of Aquaterra. As we steward our entry into the market, we have the opportunity to be the market leader and most significant provider of solutions to overcome the omega-3 supply deficit.

Thank you for the interest in the program and joining us today.