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Dear Secretary, Social Development Committee

**RE: Submission to the Inquiry into the prevalence and effectiveness of programs in preschools and schools to ensure children and young people don't go hungry during the day**

In South Australia, thousands of children arrive at school each day undernourished or hungry due to food insecurity, with an estimated 75,000 children living in the poorest families in South Australia (Connolly, 2022). This food insecurity is both a humanitarian and a social inclusion and education issue. Therefore, addressing child hunger in schools, is vital for both social equity and educational outcomes. Recognising this, the South Australian government expanded the school breakfast program in 2023. However, we must ask ourselves a critical question, and that is, has poverty shaped our expectations to the point where simply alleviating hunger is seen as adequate? AARPN contends that such a position risks neglecting our broader social responsibility. School breakfast and lunch programs must move beyond the provision of basic sustenance to deliver nutritional quality that meaningfully enhances children's ability to learn, develop, and succeed. Educational achievement and long-term life opportunities are inextricably linked, and the nutritional support provided through these programs should reflect that interdependence. In this submission, AARPN outlines the biochemical and nutritional rationale for advancing these essential initiatives from a focus on 'filling bellies' to a commitment to 'nourishing minds and life potential'.

Further to the above, we also carry a responsibility not merely to provide food, but to ensure that the food offered does not inadvertently contribute to long-term harm. Regular provision of meals that are disproportionately high in refined carbohydrates and low in protein risks conditioning dietary patterns that promote metabolic dysfunction. Early-life exposure to such imbalanced nutrition has been linked to increased risk of insulin resistance, adiposity, and other components of metabolic syndrome (Zhao et al. 2020). In any developed country including Australia, it is neither ethical nor sustainable to address short-term hunger in ways that also compromise long-term health, and this is particularly in a population that already faces so many potential health challenges from poverty. In fulfilling our humanitarian obligation to nourish children, we must also avoid reinforcing nutritional environments that predispose them to chronic disease.

AARPN recognises that there are budgetary constraints, but feels that a minimum, there needs to be an exploration and engagement of cost-effective ways to increase the protein content of the food offered. This submission puts forward the reasons why protein enriched meals are important for children's physical health, satiety, mood, and academic performance.

This submission addresses the following points of interest for the inquiry:

- b) the *academic* and social impacts of preschool and school hunger; and
- f) any other related matters.

## 1. Introduction

Children who regularly come to school hungry or undernourished suffer academically and socially. The school-age period marks a pivotal developmental phase characterised by profound transformations across multiple physiological systems. Children undergo substantial development of neurological and cognitive capabilities, alongside critical changes in skeletal growth including linear bone development and enhanced mineralisation processes.

Simultaneously, significant alterations occur in body composition and the maturation of various organ systems. This developmental window is particularly notable for the emergence of distinct sex-based variations in growth patterns and developmental trajectories. These differences become increasingly pronounced during the school-age years, influencing both physical and cognitive development pathways (Akseer et al. 2017).

Proper nutrition during the developmental years is essential to support these transformations and serves multiple crucial functions beyond basic growth support. Additionally, strategic dietary interventions during this phase may help correct dietary imbalances that may have developed since infancy (Savendra et al. 2023). In contrast, deprivation of essential macro and micronutrients give rise to undernutrition and malnutrition during critical developmental phases of childhood to adolescence. Children experiencing nutritional deficiency are susceptible to difficulty mastering tasks and poorer school performance (Food Research & Action Centre, 2025). Chronically hungry adolescents are also at greater risk of behavioural and disciplinary problems, and trouble forming peer relationships (Saavedra & Prentice, 2023; Food Research & Action Centre, 2025). Ensuring students are fed at school helps level the playing field for disadvantaged children, improving their ability to learn and thrive. For South Australia, expanding school meal provision was and is a crucial step. However, ensuring children have any food at school while addressing acute hunger - does not guarantee that the food possesses the nutritional substrates required for effective learning.

School breakfast programs refer to cereal, toast, jam, and tinned fruit as a healthy breakfast – but refined cereal and white bread toast is not a healthy breakfast, and we need to stop framing it that way. Equity in access to food demands not just calories, but quality: each meal must furnish the biochemical building blocks for cognition if we are

to meet our social as well as humanitarian duty of care to children coming to school hungry. A basic start to this goal can be achieved with the incorporation of more protein sources in the food provided. We put forward that while breakfast programs can equalise the presence of food, failing to incorporate adequate protein perpetuates a *molecular/biochemical disadvantage* for children from disadvantaged backgrounds.

### **The pitfalls of high-carbohydrate, low-protein meals**

*Carbohydrate-heavy breakfasts with little protein can inadvertently set children up for cycles of hunger and poor concentration.*

Foods such as ultra processed sugary cereals, white toast, and fruit juice are high in refined carbohydrates and simple sugars. They are digested rapidly, causing a quick spike in blood glucose (Calcaterra et al. 2023). This transient boost of energy is soon followed by a sharp drop (“sugar crash”) as insulin drives glucose into tissues. The result is that by mid-morning, children may feel hungry, tired, and unfocused. Scientific research supports this pattern: consuming high glycaemic index (GI) carbohydrates leads to a rapid rise and fall in blood sugar (Lennerz & Lennerz, 2018). In effect, a low-protein, high-GI breakfast can trigger a child to feel hunger again sooner, potentially prompting them to lose focus on schoolwork (Sievenpiper, 2020).

Furthermore, meals overly rich in refined carbohydrates may disrupt normal appetite regulation in the brain. Studies in animal models show that long-term intake of palatable refined carbohydrates can distort neurotransmitter signalling related to hunger and satiety. For example, a high-refined-carb diet in rats was found to alter hypothalamic serotonin and dopamine pathways, leading to disrupted satiety signal (Spadaro et al. 2015). Recent human clinical trials have reported alteration in homeostatic and hedonic neurophysiological responses, leading to increased hunger and cravings with special preference for high-glycaemic-index carbohydrates following a meal with high-carbohydrate/minimal protein and fat content. In simpler terms, excessive refined carbs can hijack the brain’s reward and appetite centres, potentially conditioning children to prefer sugary high carbohydrate foods (Clemente-Suárez et al. 2022), for a lifetime.

The short-term cognitive effects of a high-carb, low-protein breakfast are also problematic. Because of blood sugar volatility, children may have trouble concentrating, mood swings, or irritability as their glucose levels fluctuate. Research on breakfast GI and cognition in school-age children underscores this point. In a controlled trial with adolescents, those who ate a *low-GI* breakfast (releasing glucose slowly) performed significantly better on memory and attention tests than those who ate a *high-GI* breakfast or no breakfast at all (Cooper et al. 2012). The low-GI meal led to faster reaction times and more consistent accuracy on cognitive tasks, whereas the high-GI meal’s quick glucose spike was associated with worse performance and a decline in accuracy. The study concluded that *“a low-GI breakfast is most beneficial for adolescents’ cognitive function, compared with a high-GI breakfast or breakfast*

*omission*” (Cooper et al. 2012). High-GI meals (often lacking protein or fibre to moderate glucose release) can thus potentially leave students mentally foggy once the initial sugar rush wears off. In contrast, including protein and/or low-GI foods steadies blood sugar and attention levels.

Further, feeding and establishing food consumption patterns that include predominantly starchy or sugary foods can have long-term metabolic consequences. Public health research links high consumption of refined carbohydrates to increased risks of metabolic diseases. For instance, diets high in refined grains and added sugars are associated with greater risk of type 2 diabetes (Clemente-Suárez et al. 2022). Children who routinely start their day with sugary, low-protein foods may be on a path that predisposes them to metabolic issues later in life if those habits persist. By contrast, improving the nutritional profile of school breakfasts could help instil healthier eating patterns (e.g., oatmeal with milk or milk substitute and fruit, instead of sugar sweetened cereal or white bread and jam), with this potentially reducing long-term health risks (Revheim et al. 2024).

In summary, while any breakfast is better than no breakfast, a meal composed mainly of refined carbohydrates is a missed opportunity - it may alleviate immediate hunger but can be at the cost of a mid-morning crash, conditioned preference for refined and high carbohydrate foods, and suboptimal cognitive and metabolic outcomes.

### **Benefits of protein-rich breakfasts for satiety and performance**

Including a substantial source of protein with breakfast can dramatically improve the meal’s nutritional impact. Proteins digest more slowly than simple carbohydrates and have well-documented effects on satiety hormones. A protein-rich meal helps stabilise blood glucose and keeps hunger at bay longer into the day compared to a lower protein/higher glycaemic index meal (Qiu, Zhang, Long & He, 2021). Beyond curbing hunger, controlled trials have observed direct improvements in cognitive performance when protein is included in the meal. A comprehensive review on macronutrients and cognition noted that protein intake tends to *“boost executive function and working memory when task demands are high,”* compared to lower-protein diets (Muth & Park, 2021). This suggests that during challenging mental tasks, having had a protein-rich meal may support students’ mental clarity and working memory. A field study in the US comparing two versions of a school breakfast: one standard (mostly carbohydrates, ~12g protein) and one higher protein (~24g protein) found improvements in mood and alertness in students that had consumed the higher protein breakfast (Braden & Leidy, 2020).

It is also worth noting that protein is essential for physical growth and development, especially in young children. After an overnight fast, children are effectively in a mild catabolic state (breaking down tissue protein). Breakfast is an opportunity to restore a positive protein balance needed for growth. A clinical trial demonstrated that consuming at least 7 grams of protein at breakfast is enough to switch children’s bodies from a net protein loss to a net protein gain, with higher doses (such as 14g or 21g) further enhancing protein synthesis for growth (Karagounis et al. 2018).

Adequate protein supports muscle and tissue development in growing children. In populations facing food insecurity, ensuring some quality protein in the school breakfast program, can help fill nutritional gaps that might otherwise impair growth, immunity, or developmental milestones.

In summary, incorporating sufficient protein in school breakfasts yields multiple overlapping benefits: greater satiety, meaning children stay full and focused for longer; improved mood and energy, reducing behavioural issues stemming from hunger or sugar crashes; enhanced cognitive functioning, such as better memory and attention during the school day; and support for healthy physical development. These outcomes translate to better readiness to learn and potentially improved academic performance over time.

## **2. Nutritional biochemical mechanisms**

### **2.1. Restoring protein balance**

- Rationale: After 10–12 hours without food, children’s bodies enter net protein breakdown to supply amino acids for blood-glucose maintenance.
- Karagounis et al. (2018) measured whole-body nitrogen turnover in 7–11-year-olds and found that 7 g of milk protein at breakfast halts further net protein loss and that 21 g drives a 42 percent increase in protein synthesis over nine hours versus no-protein controls.
- Implication: Morning protein replenishes plasma amino acids, safeguarding both muscle and neuronal pools.

### **2.2. Glycaemic control and continuous fuel supply**

- Rationale: Rapid glucose excursions from high-carbohydrate meals yield post-prandial “sugar crashes” that can impair cognition.
- Evidence: Muth & Park (2021) report that co-ingesting protein slows gastric emptying and produces a flatter glycaemic curve, reducing hypoglycemics dips. Reduction in hypoglycemics dips logically also serves to reduce incidence of hypoglycaemia-induced cognitive impairment. Consumption of high dietary glycaemic load, results in compensatory responses and hormones, which could lower plasma glucose to concentrations that trigger the secretion of autonomic counter-regulatory hormones such as cortisol, that may cause changes in anxiety, irritability, and hunger (Firth et al. 2020).
- Implication: A steady glucose supply meets the brain’s ~20 percent resting energy demand, sustaining attentional capacity. It additionally benefits from insulin’s central roles in memory consolidation and neuroprotection (Apostolatos et al. 2012). Beyond peripheral metabolism, insulin acts in the brain to enhance synaptic plasticity and memory consolidation (Agarwal et al. 2021).

### 2.3. Supplying neurotransmitter precursors

- Rationale: Dopamine and serotonin syntheses require dietary tyrosine and tryptophan from protein food sources.
- Evidence: Muth & Park (2021) demonstrate that protein-rich meals elevate plasma precursor ratios relative to competing amino acids, supporting monoamine synthesis.
- Implication: Supports adequate neurotransmitter production for attention and mood regulation. Monoamine neurotransmitters underpin attention, executive function, and mood regulation.

### 3. Translating nutritional biochemical equity into practice to address hunger

Achieving equity of nutritional quality requires that every school meal deliver a least 7 g of high-biological-value protein. Practical options include:

- Milk powder fortification: 30 g skim-milk powder in porridge → 12 g protein. This is highly palatable as it makes it very creamy and naturally sweet to taste.
- Non-dairy-based protein powder fortification of drinks/cereal.
- Protein bars.
- Shelf-stable legumes: 100 g canned baked beans → 6 g protein (with 2 pieces toast = total 12 g).
- Yoghurt: 125 g plain yogurt → 6 to 10 g protein.
- Protein enriched drinks/smoothies.
- Porridge/Oatmeal, overnight oats (e.g., protein powder/milk powder fortified porridge + milk or milk substitute) to achieve ≥ 15 g protein).
- Overnight chia puddings -> 6 g protein and it contains omega 3 fatty acids (add extra milk powder to boost to 12 g in total).

Options like overnight oats and overnight chia pudding could be made by the students at the conclusion of their breakfast – eat one and make one, or by the nutrition or home economics classes.

### 4. Conclusion

Genuine educational equity requires more than the provision of food - it requires the delivery of nutrients essential for cognitive development and emotional regulation. Including a minimum of 7 to 15 grams of high-quality protein in each school breakfast engages well-established biochemical pathways that stabilise blood glucose levels, support neurotransmitter synthesis, and promote sustained attention and mood stability. In contrast, meals dominated by refined carbohydrates contribute to glycaemic instability and trigger stress-related hormonal responses, which can

impair emotional self-regulation and concentration. These divergent physiological outcomes highlight the importance of adequate protein in school breakfast options. To truly fulfil the purpose of school breakfast programs - not only to alleviate hunger but to support learning - we must shift from a model of basic caloric provision to one grounded in nutritional adequacy and equity.

If you would like to discuss any of the issues raised in this submission, please do not hesitate to contact AARPN at [admin@aarpn.com](mailto:admin@aarpn.com).

Yours sincerely,



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