

Prepared for: Lilydale Select Free Range Chicken
By: Food & Nutrition Australia **August 2009**

THE HEALTH AND NUTRITIONAL BENEFITS OF CHICKEN







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1. Summary

This report summarises and compares the nutritional value of chicken thighs, chicken drumsticks, chicken wings and whole chicken. The data for chicken is also compared with the nutritional value of other commonly consumed meats including lamb, beef, pork, veal and fish.

Results are tabulated and conclusions drawn regarding the nutritional benefits of the different cuts of chicken and how this compares to other commonly eaten meats. The most suitable cuts of chicken for particular groups in the population are identified and recommendations made regarding appropriate cooking methods for maintaining the health and nutritional value of the various cuts of chicken.

Key findings from the report include:

- Skinless whole chicken is lower in kilojoules and saturated fat than lean diced beef, lean diced lamb and Atlantic salmon.
- Skinless whole chicken is higher in a range of B vitamins compared to many other cuts of meat included in this analysis.
- Chicken is among the richest selenium sources of the commonly eaten meats included in this report.
- Skinless chicken provides 14-20% of the daily adequate intake recommendation for long chain omega-3 fatty acids for men and 26-36% for women.
- A 100g serve of skinless chicken provides 14-20% of the daily adequate intake recommendations.

All cuts of skinless chicken provide similar kilojoules and are therefore appropriate to include as part of a varied, healthy diet, including for those concerned about their weight. A 100g serve of chicken provides around 5% of an adults' daily kilojoule needs.

All cuts of skinless chicken provide less than or equal to 5g fat per 100g, representing no more than 7% of the daily intake for fat in an average adult's diet. All cuts of skinless chicken provide less than or equal to 1.5g saturated fat, representing 6% or less of the amount recommended in a healthy diet. In all cuts of chicken, including those with skin, the healthy monounsaturated and polyunsaturated fat types make up 70% of the total fat content.

Chicken is best served as part of a balanced diet that also includes plenty of vegetables, moderate amounts of fruit, wholegrains, low fat dairy foods, other lean meats and alternatives and small amounts of healthy fats and oils.

Different cuts of chicken have different levels of key nutrients and as a result, most groups in the population would benefit from consuming a variety of chicken cuts.



2. Introduction

Food & Nutrition Australia (FNA) was commissioned by Lilydale to compile and review the nutritional value of whole chicken and various cuts of chicken including breast, thigh, drumstick and wing. This report outlines the nutritional value of chicken and compares the results with a selection of other red and white meats and fish. Recommendations are made regarding the most suitable cuts of chicken for various groups in the population and the best cooking methods to use to maintain the nutritional and health value of chicken.

Methods

Nutrient data for chicken and the various other meats included in the report was obtained from the Australian food composition database, NUTTAB 2006¹. For whole chicken, the percentage contribution each cut of chicken makes to the whole was obtained from an analysis conducted by the Australian Government Analytical Laboratories (AGAL) on behalf of the Australian Chicken Meat Federation. The nutritional value of whole chicken was calculated using the data from the various cuts and their relative contribution to the whole chicken. The data was tabulated and a comparison undertaken to identify the key nutritional attributes of whole chicken and the various cuts of chicken compared to a selection of other comparable cuts of meat and fish.

Tables and references can be found at the back of this report.



3. Nutritional Value of Various Chicken Cuts

This section highlights the nutritional value of chicken compared to various other cuts of meat and fish. The types of meats and cuts selected for comparison were based on those considered similar substitutes.

Whole chicken

Table 1 compares whole chicken, with and without the skin, to other types of meats. This comparison shows lean whole skinless chicken is:

- Lower in kilojoules than lean diced beef, lean diced lamb and Atlantic salmon.
- Higher in protein than pork forequarter shoulder roast but lower than diced beef, diced lamb, diced veal, whiting and Atlantic salmon.
- Lower in total fat compared to lean diced lamb and Atlantic salmon.
- Lower in saturated fat compared to lean diced beef, lean diced lamb, pork forequarter shoulder roast and Atlantic salmon.
- Higher in selenium compared to all other cuts of meat included in the analysis except whiting.
- Higher in thiamin (vitamin B1) compared to lean diced beef, lean diced veal, whiting and Atlantic salmon.
- Higher in riboflavin than lean diced beef, lean diced veal, whiting and Atlantic salmon.
- Higher in niacin than all other cuts of meat included in the analysis except lean diced veal.
- Higher in vitamin B6 than all other cuts of meat included in the analysis except lean diced veal.
- Higher in pantothenic acid than all other cuts of meat included in the analysis except lean diced veal.
- Higher in retinol than all other cuts of meat included in the analysis except Atlantic salmon.
- Higher in vitamin E than all other cuts of meat included in the analysis.

The comparison in *Table 1* also shows that whole chicken with the skin on is:

- Lower in kilojoules than pork forequarter shoulder roast.
- Higher in protein than pork forequarter shoulder roast but lower than diced beef, diced lamb and diced veal.
- Lower in total fat compared to pork forequarter shoulder roast.
- Lower in saturated fat compared to pork forequarter shoulder roast.
- Higher in potassium compared to all other cuts of meat included in the analysis.
- Higher in selenium compared to all other cuts of meat included in the analysis except diced beef.
- Higher in niacin compared to all other cuts of meat included in the analysis except diced veal.
- Higher in retinol than all other cuts of meat included in the analysis.
- Higher in vitamin E than all other cuts of meat included in the analysis.

Chicken breast

Table 2 compares lean chicken breast to other similar cuts of meat. This comparison shows lean chicken breast is:

- Lower in kilojoules than all other cuts of meat included in the analysis except whiting.
- Higher in protein than lamb strips, pork fillets and whiting but lower than beef strips and veal strips.
- Lower in total fat and saturated fat than all other cuts of meat included in the analysis except whiting.
- Higher in selenium compared to all other cuts of meat included in the analysis except whiting.
- Higher in niacin than all other cuts of meat included in the analysis except veal strips.
- Higher in vitamin B6 than lamb strips and whiting but lower than veal strips.
- Higher in pantothenic acid than lamb strips, pork fillets and whiting but less than veal strips.
- Higher in retinol compared to all other cuts of meat included in analysis except lamb strips.
- Higher in vitamin E than all other cuts of meat included in the analysis.

Chicken thigh

Table 3 compares lean chicken thigh to other similar cuts of meat. This comparison shows lean chicken thigh is:

- Lower in kilojoules than beef topside steak and lamb chump chop but higher than pork loin chop and veal cutlet.
- Lower in protein than all other cuts of meat included in the analysis.
- Lower in total and saturated fat than lamb chump chop but higher than other cuts of meat included in the analysis.
- Contains similar amounts of selenium and riboflavin as lamb chump chop which is higher than the other cuts of meat included in the analysis.
- Lower in thiamin than lamb chump chop and pork loin chop but higher than beef topside steak and veal cutlet.
- Lower in niacin than lamb chump chop and veal cutlet but higher than beef topside steak and pork loin chop.
- Higher in biotin than lamb chump chop and pork loin chop.
- Higher in pantothenic acid than all other cuts of meat included in the analysis except veal cutlet.
- Higher in vitamin E than all other cuts of meat included in the analysis.

Chicken drumstick

Table 4 compares lean chicken drumstick to other similar cuts of meat. This comparison shows lean chicken drumsticks are:

- Lower in kilojoules compared to all other cuts of meat included in the analysis except veal leg roast.
- Lower in protein than all other cuts of meat included in the analysis.
- Lower in fat than lamb leg roast but higher than all other cuts of meat included in the analysis.
- Lower in saturated fat than lamb leg roast but similar to beef round steak and diced pork leg.
- Higher in thiamin compared to all other cuts of meat included in the analysis except diced pork leg.
- Higher in niacin compared to all other cuts of meat included in the analysis except veal leg roast.



- Higher in vitamin B6 compared to beef round steak and lamb leg roast but less than veal leg roast.
- Higher in biotin than lamb leg roast and diced pork leg.
- Higher in pantothenic acid compared to all other cuts of meat included in the analysis except veal leg roast.
- Higher in retinol compared to all other cuts of meat included in the analysis.

Chicken wings

Table 5 compares chicken wings to other similar cuts of meat. This comparison shows untrimmed chicken wings are:

- Lower in kilojoules than beef Tbone steak but higher than pork forequarter shoulder roast and lamb frenched cutlet/rack.
- Lower in protein than all other cuts of meat included in the analysis.
- Higher in fat than all other cuts of meat included in the analysis.
- Higher in saturated fat than all other cuts of meat included in the analysis except beef Tbone steak.
- Higher in vitamin B6 than beef Tbone steak and lamb frenched cutlet/rack.
- Higher in retinol than all other cuts of meat included in the analysis.



4. Contribution of Chicken to the Diet

4.1 Contribution to Daily Nutrient Intakes

Table 6 shows the recommended dietary intakes (RDI's) and Daily Intake (DI) values utilised as reference figures for nutrient and daily intake claims on packs. Table 7 shows the percentage contribution the various chicken cuts make to DI's and RDI's for the various nutrients. Based on food labelling guidelines, the following claims can be made for the various lean cuts of chicken:

- All cuts of chicken are a source of phosphorus, vitamin B6 and pantothenic acid.
- Chicken breast is a good source of phosphorus.
- All cuts of chicken are a good source of selenium.
- Chicken thigh and drumstick are a source of zinc.
- All cuts of chicken, excluding the wing, are a source of thiamin.
- Whole chicken, chicken breast and thigh are a source of riboflavin.
- Chicken is a good source of selenium and niacin.
- Whole chicken, chicken breast and chicken wings are good sources of vitamin B6.
- Whole chicken, chicken thigh and drumstick are sources of biotin.
- Whole chicken and chicken breast are a source of vitamin E.
- Chicken provides 14-20% of the daily adequate intake recommendation for long chain omega-3 fatty acids for men and 26-36% for women.
- Chicken is naturally low in sodium.
- Chicken is high in protein.

Note: all comparisons refer to 100g portion sizes and refer to lean chicken only.

Comparisons between cuts of chicken

The nutritional value of chicken varies depending on the cut and whether skin is included. Table 8 outlines the nutrients in whole chicken and the various cuts of chicken including breast, thigh, drumstick and wings. Data are included for skinless chicken and chicken cuts which include the skin.

4.1.1 Kilojoules

One of the major contributors to rising rates of obesity and overweight in Australia is consuming too many kilojoules relative to levels of physical activity. It is becoming increasingly important to obtain the recommended intake of vitamins, minerals and other key nutrients in the diet within a lower kilojoule intake in order to prevent weight gain.

Contribution of chicken cuts

Table 8 shows that of all the various chicken cuts included in the analysis, chicken breast without the skin is lowest in kilojoules, followed closely by skinless chicken wings, skinless drumstick and skinless thigh. Of note is that whole skinless chicken is only 27 kilojoules higher than skinless chicken breast, wings are 32 kilojoules higher, drumsticks 54 kilojoules higher and thigh is 58 kilojoules higher than the equivalent weight of chicken breast (100g). In a varied diet, these kilojoule differences are minor.

All cuts of chicken with the skin contain significantly more kilojoules than their skinless counterparts. Chicken wings with the skin are the highest in kilojoules providing more than double the kilojoules compared to skinless chicken breast.

Key messages: All cuts of skinless chicken provide similar kilojoules in a varied diet and are therefore appropriate inclusions in a healthy diet, including for those concerned about their weight. A 100g serve of chicken provides around 5% of an adults' daily kilojoule needs.

4.1.2 Protein

Protein is required daily in the diet to provide the building material for making cells and tissues. It is required as a key component of all enzymes and hormones, to build muscle, and to form antibodies needed for a strong immune system.

As protein is present in so many foods, most people meet protein requirements easily. However, there are certain groups within the population that may benefit from increased intakes, including children and adolescents, elderly people and those participating in regular resistance training.

Contribution of chicken cuts

Skinless chicken breast provides the highest amount of protein, providing 45% of the daily intake in one serving (100g). Skinless chicken is higher in protein than chicken with the skin. Skinless chicken thigh, wing and drumstick provide 18.3-18.7g per serving (37% of the daily intake recommended).

Key message: All cuts of lean chicken are high in protein.

4.1.3 Fat

Fat is required daily in the diet as a major source of energy (kilojoules), key component of cell membranes, for making hormones and for the absorption of fat soluble vitamins.

Recommendations for fat intake for good health are that no more than 20-35% of total energy should come from fat, with saturated fat providing less than 10% of total energy². For children over 2 years, the same recommendations apply. Children under 2 years of age require more fat, with the Australian Dietary Guidelines for Children and Adolescents recommending that 40% of the energy of children's diets in the latter part of the first year and during the second year of life come from fat³.

Contribution of chicken cuts

All cuts of skinless chicken provide less than or equal to 5g fat per 100g (5% fat). Skinless chicken breast is the lowest in fat (1.6g/100g) while chicken wings with the skin are the highest in fat, providing 17.4g per 100g portion.

All cuts of skinless chicken provide less than or equal to 1.5g saturated fat per 100g. This represents 6% or less of an adult's daily recommended intake for saturated fat.

All cuts of chicken provide more polyunsaturated and monounsaturated fat than saturated fat. Saturated fat makes up approximately 30% of the total fat in chicken, with the remaining 70% coming from the healthy unsaturated fat sources. The majority of the fat in chicken is monounsaturated (44-49%). Polyunsaturated fat makes up 15-17% of the fat content of chicken.



Key messages: All cuts of skinless chicken provide less than or equal to 5g fat per 100g, representing no more than 7% of the daily intake (DI) for fat in an average adult's diet. All cuts of skinless chicken provide less than or equal to 1.5g saturated fat, representing 6% or less of the amount recommended in a healthy diet. In all cuts of chicken, including those with skin, the healthy monounsaturated and polyunsaturated fat types make up 70% of the total fat content. Chicken breast is one of the lowest fat and saturated fat meats available.

4.1.4 Omega-3

Health authorities recommend increased consumption of omega-3 fats for good health⁴. An increased intake of omega-3 fats is now known to protect against heart disease, some inflammatory diseases and certain autoimmune disorders⁵. Omega-3 fats also play a major role in infant growth and development and have been implicated in many other protective roles.

While intake data suggests that on average, Australians meet recommended daily adequate intake values for omega-3, many fall short of the omega-3 recommendations for chronic disease prevention⁶.

Contribution of chicken cuts

Chicken provides small amounts of omega-3 fatty acids, containing between 16-32mg of total omega-3 per 100g coming from long chain sources. This represents 14-36% of the daily long-chain omega-3 adequate intake (AI) recommendation².

Key message: Chicken contains long chain omega-3 fatty acids which may make a useful contribution to daily intakes, particularly for those who do not eat seafood.

4.1.5 Thiamin

Thiamin (vitamin B1) is a water-soluble B vitamin that is found in many plant and animal foods, with the majority found in cereal foods (including its mandatory inclusion in baking flours in Australia). Thiamin plays an essential role in the supply of energy to the body, and in carbohydrate, protein and fat metabolism².

Contribution of chicken cuts

All cuts of chicken except the wing are a source of thiamin, providing 10-13% of the RDI. Chicken is higher in thiamin than many other cuts of meat.

Key message: Chicken is a source of thiamin. Chicken is one of the richest sources of thiamin of the commonly eaten meats.

4.1.6 Riboflavin

Riboflavin (vitamin B2) is a B vitamin that is needed for key reactions in the body that involve helping the body to release energy from carbohydrate, protein and fat. It is also involved in the conversion of some other nutrients into forms the body can use². The main dietary sources of riboflavin are milk and other dairy products.

Contribution of chicken cuts

Whole chicken, breast and thigh are a source of riboflavin, providing 11-14% of the RDI.

Key message: Chicken is a source of riboflavin which is needed for the release of energy from food.

4.1.7 Niacin

Niacin (vitamin B3) is a B vitamin that is involved in energy metabolism². The main dietary sources of niacin are animal foods such as meat and eggs, and wholegrain cereals. The 1995 National Nutrition Survey showed that all groups of the population met daily niacin requirements⁷.

Contribution of chicken cuts

All cuts of chicken are high in niacin providing 50-110% of the RDI per 100g portion.

Key message: Chicken is a good source of niacin. Chicken is one of the richest sources of niacin compared to other commonly eaten meats.

4.1.8 Vitamin B6

Vitamin B6 comprises six compounds which are needed for the metabolism of amino acids and in other reactions such as the formation and growth of red blood cells². Vitamin B6 is found in a wide range of foods including organ meats, muscle meats, breakfast cereals, vegetables and fruits.

Contribution of chicken cuts

Whole chicken, chicken breast and chicken wings are good sources of vitamin B6, providing 33-48% RDI per 100g.

Key message: Chicken is a good source of vitamin B6 needed for many important reactions in the body that contribute to good health and energy release..

4.1.9 Biotin

Biotin is needed by the body for the metabolism of carbohydrate and fat and to regulate glucose levels in the body⁸.

Contribution of chicken cuts

Whole chicken, chicken thigh and drumstick are a source of biotin, providing 10-13% of the RDI.

Key message: Chicken is a source of biotin.

4.1.10 Pantothenic acid

Pantothenic acid is part of an important enzyme in the body which is needed for energy release, for making amino acids and certain hormones and for the formation of red blood cells⁸. It is widely distributed in foods with chicken, beef, potatoes, oat-based cereals, tomato products, liver, kidney, egg yolks and whole grains being the major sources in a typical Australian diet².



Contribution of chicken cuts

All cuts of chicken are a source of pantothenic acid, providing 14-24% of the RDI.

Key message: Chicken is a source of pantothenic acid. Chicken is one of the highest sources of pantothenic acid of the commonly eaten meats.

4.1.11 Vitamin E

Vitamin E is required in the body as an antioxidant, for the maintenance of cell membranes, healthy red blood cells and nerves, as an anti-inflammatory agent and for a strong immune system.

A 2002 study of older people in Victoria showed 92% of males and 80% of females aged 44 years and over have vitamin E intakes less than the RDI⁹.

The 2007 national Children's Survey showed children and teenagers consume less than the adequate intake (AI) for vitamin E, but this may be because of a lack of data on the vitamin E content of the Australian food supply¹⁰.

Contribution of chicken cuts:

Chicken breast provides 22% RDI per 100g serve, containing the highest vitamin E content of all chicken cuts.

Key message: Chicken breast is a source of vitamin E. Chicken breast is the richest vitamin E source of all the commonly eaten meats included in this report.

4.1.12 Phosphorus

Like calcium, phosphorus is a major mineral in bone. Eighty-five per cent of the body's phosphorus is stored in bone².

Contribution of chicken cuts

All cuts of chicken contain a similar amount and are all a source of phosphorus, providing 20-25% of the RDI.

Key message: Chicken is a source of phosphorus which is needed for bone health.

4.1.13 Selenium

Selenium is required for making thyroid hormones, which regulate a person's basic metabolic rate. It also has an antioxidant function - working with vitamin E as part of a key antioxidant enzyme that helps protect the body from damage caused by free radicals.

The 2008 Australian Total Diet Study suggests Australians' intake of selenium is lower than ideal¹¹. While other research has found that selenium intakes may be adequate for maximisation of antioxidant activity, they may be lower than ideal for reduction of cancer risk¹².

Contribution of chicken cuts

All cuts of chicken contain a similar amount and are all a good source of selenium, providing 29-36% of the RDI.

Key message: Chicken is a good source of selenium. Chicken is among the richest selenium sources of the commonly eaten meats included in this report.

4.1.14 Sodium

Excess sodium intakes have been implicated in many chronic diseases as suggested in the World Health Organisation's report on Diet, Nutrition and Chronic Disease¹³. From a population health perspective, Australians are encouraged to reduce their daily sodium intakes.

Contribution of chicken cuts

All chicken cuts are naturally low in sodium.

Key message: Chicken is naturally low in sodium.

4.1.15 Zinc

Zinc is required by the body for the maintenance of a strong immune system, for wound healing, healthy eyes and skin and for growth and sexual development. It is involved in the activity of over 200 enzymes in the body and is required for making genetic material and proteins.

The 1995 National Nutrition Survey showed that on average, women did not meet the RDI for zinc. Around 13% of teenage boys aged 14-16 years have intakes lower than the Estimated Average Requirement (EAR)¹⁰.

As requirements for zinc increase during pregnancy and lactation, suboptimal zinc intakes are more likely in this population sub-group¹⁴.

A study of people aged 44 years and over in Australia showed 69% of males and 83% of females did not meet the RDI for zinc⁹. Zinc deficiency can increase susceptibility to infection, decrease taste sensation and appetite, and lead to poor wound healing and night blindness, all of which can jeopardise health in older Australians.

Contribution of chicken cuts

Chicken thigh and drumstick are a source of zinc, containing 13-14% RDI per 100g. Other cuts contain less than 10% of the RDI.

Key message: Chicken thigh and drumstick are a source of zinc.

4.1.16 Nutrients present in lower amounts

Chicken also contains iron, calcium, magnesium and vitamin A in amounts less than 10% RDI. While chicken makes a contribution to daily intakes of these nutrients, they are not present in high enough amounts for claims to be made for these nutrients.



5. Place of Chicken in a Healthy Eating Pattern

The Australian Guide to Healthy Eating (AGHE)¹⁵ includes chicken in the meat, fish, poultry, eggs, nuts and legumes group, with 1-2 serves from this group recommended daily for adults. There are no specific recommendations on the frequency of chicken intake within the AGHE. The AGHE does recommend red meat be eaten 3-4 times a week.

The Australian Dietary Guidelines for children and adolescents³, and adults¹⁶, recommend individuals 'Include lean meat, fish, poultry and/or alternatives'. There are no recommendations in this guide specifying or restricting the amount of chicken or poultry to consume weekly. Chicken is recognized as a good source of protein and it is also highlighted that skinless chicken has a higher proportion of both monounsaturated and polyunsaturated fats compared with the other meats³.

The National Heart Foundation of Australia (NHF) recommends two to three oily fish meals a week and two legume based meals a week however does not make any other specific recommendations regarding frequency of other protein rich foods in the diet¹⁷. The NHF does recommend removing the skin from chicken as a strategy to reduce saturated fat intake, a contributor to elevated blood cholesterol levels¹⁷. The NHF recommends increased intakes of omega-3 fats⁴.

The scientific evidence regarding the role of chicken in health has recently been reviewed by the University of Wollongong on behalf of the Australian Chicken Meat Federation¹⁸. Key findings from this report included:

- Chicken can contribute to a healthy eating pattern.
- Chicken is an important source of protein.
- Chicken breast is low in fat, and its fat profile means it provides more polyunsaturated, rather than saturated, fatty acids.
- Chicken meat delivers essential vitamins and minerals and is the most affordable meat source.

Key message: *chicken is recommended as a healthy inclusion in a balanced diet with health related organisations recognising chicken as a good source of protein, a source of omega-3 fats and as a meat with a high proportion of healthy fats.*



6. Preparing and Serving Chicken

The style of cooking is an important consideration in order to maintain the health and nutritional value of chicken. The following cooking methods are recommended as preferable options when preparing chicken:

- Grilling
- Boiling
- Baking with minimal additional fat
- Shallow frying in olive or canola oil
- Stir frying in polyunsaturated or monounsaturated oils such as peanut, sesame, canola, sunflower or safflower oils

To ensure a balanced meal, serve chicken as part of main dishes that also include plenty of vegetables and a source of carbohydrate such as brown rice, pasta, sweet potato, polenta or wholegrain bread. Aiming for half the dinner plate to contain vegetables is an appropriate guideline for both adults and children, with a quarter of the plate containing the chicken and the other quarter the carbohydrate rich food.

Chicken cuts particularly suitable for various population sub-groups are as follows:

Kids

Skinless chicken drumsticks are particularly suitable for young children (4-8 years) due to the ease of eating with the fingers. Compared to other cuts of chicken, drumsticks are the highest in omega-3, zinc, thiamin and biotin. Many children have insufficient intakes of omega-3¹⁹ and if they do not eat fish, chicken drumsticks can make a useful contribution toward daily intakes. Chicken drumsticks also provide 22% RDI per 100g serve for phosphorus, a nutrient shown to be low in many children's diets¹⁰.

Teens

The 2007 Australian Children's Nutrition and Physical Activity Survey showed key nutrients of concern in adolescents' diets included magnesium, zinc (males only), iron and phosphorus (females in particular). Intakes of calcium, folate, vitamin A, iodine, vitamins D and E were also below the recommended levels indicating significant improvements are required to the average dietary intake of teens¹⁰.

Skinless chicken drumsticks are the highest in zinc of all the chicken cuts, followed closely by chicken thigh. Chicken breast is highest in magnesium and phosphorus as well as being the highest in niacin, vitamin B6, selenium and vitamin E. Skinless chicken thigh, drumstick, breast and therefore whole chicken make a useful contribution to the diets of teens by providing a range of nutrients often low in a typical adolescents diet.

Pregnancy

Nutrient requirements increase during pregnancy for a broad range of nutrients including protein, selenium, zinc, vitamin B6, niacin and pantothenic acid. A 100g serve of skinless chicken breast provides the additional nutrient requirements for each of these nutrients during pregnancy. Whole chicken also provides significant amounts of these nutrients with a 100g serve of skinless whole chicken providing all of the additional needs for protein, selenium, niacin and pantothenic acid during pregnancy. Zinc requirements during pregnancy increase by 3mg. A 100g serve of chicken thigh provides 50% of the increased requirements for pregnancy and a 100g serve of chicken drumstick provides 57% of the increased requirements. The adequate intake of long chain omega-3 fats increases by 25mg during pregnancy. A 100g serve of skinless drumstick, thigh or whole chicken provides 100% or more of the increased requirement for omega-3 during this time.

Older Adults

The Dietary Guidelines for Older Australians recognise that older people often have difficulty chewing foods and can experience a loss of appetite.

Many older adults do not eat the minimum number of serves from the core food groups required for good health, however some nutrient requirements increase with age. As a result, nutrients that are commonly low in the diet of older Australians include fibre, calcium, vitamins A, E, B6, B12, folate, vitamin C, iron, magnesium and zinc.

Skinless chicken breast is highest in protein, vitamin E and vitamin B6 while chicken thigh is highest in iron and chicken drumstick is highest in zinc. Older Australians would therefore benefit from eating a variety of chicken cuts, and therefore also enjoying whole chicken.

Healthy ideas with chicken drumsticks:

- Marinate in a mix of olive oil, mixed herbs, garlic and lemon juice. Grill, BBQ or bake in the oven.
- Marinate in a mix of ginger, garlic, salt reduced soy sauce and honey. Bake in the oven.
- Dip skinless drumsticks into flour then buttermilk. Coat with crushed cornflakes mixed with your favourite herbs and/or spices. Bake in the oven.
- Empty a bottle of tomato passata into a baking dish. Add crushed garlic, a tablespoon of olive oil, a handful of black olives and chunks of potato and carrot. Add skinless chicken drumsticks, coating with the sauce. Bake in the oven stirring occasionally.

Healthy ideas with chicken thighs:

- Thread cubed chicken thigh fillets, grape tomatoes and red onion wedges onto skewers. Brush lightly with a mixture of olive oil and crushed garlic and cook on a grill or BBQ. Serve with a large green salad and wholegrain bread.
- Marinate chicken thigh fillets in a mix of ginger, sesame oil and lime juice. BBQ or grill and serve with brown rice and Asian greens.
- Combine coarsely chopped chicken thigh fillets with red onion and ginger. Stir fry in peanut oil. Separately stir fry carrot and snow peas before combining with the chicken and some baby bok choy.



Tasty ideas with chicken wings:

- Pour a mixture of lemon juice, lemon rind, honey, reduced salt soy sauce and sesame seeds over chicken wings. Cook in a preheated oven, stirring frequently.
- Chicken wings can be steamed in bamboo steamers or a commercial stand-alone steamer for deliciously tender meat. Infuse meat with added flavour while cooking by adding herbs such as rosemary and garlic into the water. Serve immediately with a ginger garlic dipping sauce, rice and Asian greens.

Healthy ideas with whole chicken:

- Whole chicken is best cooked on a rack. Stuff with wholemeal bread crumbs mixed with olive oil and your favourite herbs. Good choices include thyme, sage, chives, tarragon and parsley. Before serving, remove the skin. Serve with plenty of oven roasted vegetables.
- For a lemon flavour, squeeze lemon over the chicken before cooking. Place the remaining lemon pieces into the cavity of the chicken along with a few bay leaves.
- For a spiced roast chicken, prepare a ground spice mixture of cumin, coriander, fennel and pepper. After stuffing the chicken, drizzle with a little olive oil before rubbing the spice mix into the chicken skin and baking.



7. Summary

The findings of this report demonstrate skinless whole chicken and its various cuts, can be included in a healthy diet. Chicken contributes key nutrients to the diet, in particular being a good source of protein, providing a broad range of B vitamins, and being a good source of selenium. Chicken also provides a useful contribution to omega-3 intakes and skinless whole chicken is lower in kilojoules than diced lean beef and lamb. Different cuts of chicken have different levels of key nutrients and as a result, most groups in the population would benefit from consuming a variety of chicken cuts. Of note is that lean whole chicken, breast, thigh, wing and drumstick contain a similar kilojoule level making all cuts of lean chicken suitable for inclusion in the diet of those watching their weight.

Chicken is best served as part of a balanced diet that also includes plenty of vegetables, moderate amounts of fruit, wholegrains, low fat dairy foods, other lean meats and alternatives and small amounts of healthy fats and oils.



8. Tables

Table 1a compares whole chicken with skin to other types of untrimmed meats.

Per 100g	Whole chicken	Diced beef	Lamb blade/ chuck diced	Pork forequarter shoulder roast	Diced veal
Energy (kJ)	683	615	588	762	466
Protein (g)	18.4	27.6	21.1	17.6	23.0
Fat (g)	10.0	3.9	6.2	12.5	2.0
- Sat. (g)	3.0	1.5	2.2	4.8	0.8
- Mono. (g)	5.0	1.6	2.5	5.4	0.7
- Poly. (g)	1.4	0.4	0.7	1.6	0.3
- ALA C18:3w3 (mg)	0.08	0.04	0.13	0.10	0.02
- Long chain n-3 (mg)	21	76	129	21	60
- DHA C22:6w3 (mg)	8	6	22	28	6
- DPA C22:5w3 (mg)	10	43	64	14	32
- EPA C20:5w3 (mg)	2	27	42	0	22
Cholesterol (mg)	75	54	78	66	55
Carbohydrate (g)	0	0	0	0	0
Calcium (mg)	11	5	5	14	6
Iron (mg)	0.5	1.7	2.2	1.1	0.9
Magnesium (mg)	22	24	27	19	22
Phosphorus (mg)	203	237	246	182	218
Potassium (mg)	610	336	335	329	327
Selenium (ug)	18	19	15	12	0
Sodium (mg)	52	38	52	69	46
Zinc (mg)	1.1	5.6	4.2	2.3	3.6
Thiamin (mg)	0.09	0.03	0.13	0.59	0.06
Riboflavin (mg)	0.19	0.11	0.21	0.24	0.20
Niacin (mg)	7.0	3.0	4.5	3.5	15.8
Vitamin B6 (mg)	0.43	–	0.10	–	0.79
Biotin (ug)	3	–	–	4	–
Pantothenic acid (mg)	0.94	–	0.91	0.88	1.49
Retinol Equiv. (ug)	29	3	9	10	1
Vitamin E (mg)	1.1	0.5	0.4	0.1	0.5

Table 1b compares whole chicken without skin to other types of trimmed meats.

	Whole chicken	Diced beef	Diced lamb	Pork forequarter shoulder roast	Diced veal	King George whiting	Atlantic salmon fillets
Per 100g	Trimmed (except fish)						
Energy (kJ)	465	587	567	447	452	372	845
Protein (g)	20.3	27.8	21.2	19.6	23.1	20.3	20.7
Fat (g)	3.2	3.1	5.6	3.1	1.6	0.7	13.3
- Sat. (g)	1.0	1.1	2.1	1.1	0.6	0.2	3.7
- Mono. (g)	1.5	1.2	2.3	1.2	0.6	0.1	5.3
- Poly. (g)	0.5	0.4	0.7	0.5	0.3	0.2	2.5
- ALA C18:3w3 (mg)	0.03	0.04	0.12	0.02	0.02	0	0.11
- Long chain n-3 (mg)	25	77	129	31	60	115	1565
- DHA C22:6w3 (mg)	10	6	23	11	6	46	812
- DPA C22:5w3 (mg)	12	44	63	17	32	22	247
- EPA C20:5w3 (mg)	3	28	43	0	22	46	505
Cholesterol (mg)	70	54	78	60	55	98	65
Carbohydrate (g)	0	0	0	0	0	0	0
Calcium (mg)	11	5	5	11	6	38	7
Iron (mg)	0.5	1.7	2.2	1.1	0.9	0.2	1.1
Magnesium (mg)	25	24	27	21	22	29	25
Phosphorus (mg)	230	239	249	200	220	261	262
Potassium (mg)	283	339	338	370	329	364	306
Selenium (ug)	22	20	10	15	0	53.5	22
Sodium (mg)	54	38	53	75	46	72	42
Zinc (mg)	1.1	5.7	4.3	2.7	3.6	0.8	0.3
Thiamin (mg)	0.11	0.03	0.13	0.66	0.03	0	0.09
Riboflavin (mg)	0.19	0.11	0.21	0.27	0.02	0	0.1
Niacin (mg)	8.4	3.0	4.5	3.8	16.0	4.4	3.1
Vitamin B6 (mg)	0.54	-	0.10	-	0.80	0.23	-
Biotin (ug)	2.9	-	1.5	3.1	-	2.7	-
Pantothenic acid (mg)	1.05	-	0.92	0.95	1.50	0.18	-
Retinol Equiv. (ug)	14	2	9	0	0	0	19
Vitamin E (mg)	1.3	0.5	0.4	0	0.5	0.5	-



Table 2 compares lean chicken breast to other similar cuts of meat.

Per 100g	Chicken breast	Beef stir fry strips	Trim lamb stir fry strips	Pork fillets	Veal stir fry strips	King George whiting
Energy (kJ)	438	544	544	458	547	372
Protein (g)	22.3	27.1	21.8	22	27.1	20.3
Fat (g)	1.6	2.2	4.7	2.3	2.3	0.7
- Sat. (g)	0.5	0.8	1.6	0.9	0.9	0.2
- Mono. (g)	0.7	0.8	1.9	1	0.8	0.1
- Poly. (g)	0.3	0.3	0.5	0.3	0.3	0.2
- ALA C18:3w3 (mg)	0.01	0.03	0.05	0.02	0.03	0
- Long chain n-3 (mg)	23	57	65	14	80	115
- DHA C22:6w3 (mg)	9	4	10	6	8	46
- DPA C22:5w3 (mg)	9	33	37	6	42	22
- EPA C20:5w3 (mg)	5	20	19	0	30	46
Cholesterol (mg)	59	54	78	95	55	98
Carbohydrate (g)	0	0	0	0	0	0
Calcium (mg)	12	5	5	4	7	38
Iron (mg)	0.32	1.7	2.2	1.1	1.5	0.2
Magnesium (mg)	28	24	27	26	28	29
Phosphorus (mg)	250	239	248	237	278	261
Potassium (mg)	300	339	338	405	417	364
Selenium (ug)	25	20	10	15	0	53.5
Sodium (mg)	41	38	53	54	56	72
Zinc (mg)	0.7	5.7	4.3	1.7	4.7	0.8
Thiamin (mg)	0.11	0.03	0.13	0.82	0.06	0
Riboflavin (mg)	0.19	0.11	0.2	0.19	0.2	0
Niacin (mg)	11.0	3.0	4.2	5.8	15.8	4.4
Vitamin B6 (mg)	0.76	-	0.09	-	0.8	0.23
Biotin (ug)	2.1	-	2.1	1.9	-	2.7
Pantothenic acid (mg)	1	-	0.92	0.71	1.49	0.18
Retinol Equiv. (ug)	8	2	9	1	0	0
Vitamin E (mg)	2.2	0.5	0.4	0.3	0.5	0.5

Table 3 compares lean chicken thigh to other similar cuts of meat.

Per 100g	Chicken thigh	Beef topside steak	Lamb chump chop	Pork loin chop	Veal cutlet
Energy (kJ)	496	508	719	440	494
Protein (g)	18.3	22.2	21.3	22.2	24.4
Fat (g)	5	3.5	9.6	1.7	2.1
- Sat. (g)	1.5	1.4	3.7	0.6	0.9
- Mono. (g)	2.4	1.4	3.6	0.7	0.7
- Poly. (g)	0.8	0.4	0.7	0.3	0.2
- ALA C18:3w3 (mg)	0.05	0.02	0.15	0.01	0.02
- Long chain n-3 (mg)	24	72	73	17	65
- DHA C22:6w3 (mg)	9	6	9	6	7
- DPA C22:5w3 (mg)	14	45	47	9	33
- EPA C20:5w3 (mg)	0	22	17	0	29
Cholesterol (mg)	79	35	65	55	36
Carbohydrate (g)	0	0	0	0	0
Calcium (mg)	10	4	6	19	8
Iron (mg)	0.7	1.2	2.8	0.8	0.7
Magnesium (mg)	24	24	28	25	23
Phosphorus (mg)	220	199	321	220	235
Potassium (mg)	280	358	324	410	324
Selenium (ug)	20	10	20	19	0
Sodium (mg)	62	44	61	66	44
Zinc (mg)	1.5	3	3.3	1.9	3.5
Thiamin (mg)	0.11	0.03	0.14	0.71	0.06
Riboflavin (mg)	0.24	0.11	0.24	0.15	0.2
Niacin (mg)	6.0	3.0	6.1	5.2	15.5
Vitamin B6 (mg)	0.27	0.22	0.12	-	0.79
Biofin (ug)	3.7	-	1.7	1.8	-
Pantothenic acid (mg)	1.2	0.27	0.87	0.65	1.48
Retinol Equiv. (ug)	19	2	11	0	1
Vitamin E (mg)	0.6	0	0.5	0.2	0.5



Table 4 compares lean chicken drumstick to other similar cuts of meat.

Per 100g	Chicken drumstick	Beef round steak	Lamb leg roast	Pork leg diced	Veal leg roast
Energy (kJ)	492	494	587	503	489
Protein (g)	18.5	20.8	20.5	21.1	24.3
Fat (g)	4.8	3.8	6.5	3.9	2
- Sat. (g)	1.4	1.4	2.4	1.5	-
- Mono. (g)	2.3	1.4	2.5	1.7	-
- Poly. (g)	0.8	0.4	0.5	0.5	-
- ALA C18:3w3 (mg)	0.04	0.02	0.09	0.03	-
- Long chain n-3 (mg)	32	72	54	21	-
- DHA C22:6w3 (mg)	14	6	7	10	-
- DPA C22:5w3 (mg)	18	45	34	7	-
- EPA C20:5w3 (mg)	0	22	14	0	-
Cholesterol (mg)	84	62	70	55	57
Carbohydrate (g)	0	0	0	0	0
Calcium (mg)	10	4	6	6	6
Iron (mg)	0.6	2.1	2	0.9	1.4
Magnesium (mg)	22	26	29	23	31
Phosphorus (mg)	200	227	229	225	296
Potassium (mg)	260	366	334	400	362
Selenium (ug)	20	0	20	21.5	0
Sodium (mg)	71	50	65	63	55
Zinc (mg)	1.7	4	4.4	203	4.6
Thiamin (mg)	0.14	0.03	0.12	0.61	0.06
Riboflavin (mg)	0.13	0.11	0.2	0.22	0.2
Niacin (mg)	5.0	3.0	4.4	4.8	15.7
Vitamin B6 (mg)	0.33	0.13	0.1	-	0.79
Biofin (ug)	3.9	-	2.2	2	-
Pantothenic acid (mg)	1.1	0.32	0.89	0.62	1.49
Retinol Equiv. (ug)	16	2	10	1	1
Vitamin E (mg)	0.3	0.9	0.4	0.2	0.5

Table 5 compares chicken wings (including skin) to other similar cuts of meat.

Per 100g	Chicken wing	Beef T-bone steak	Pork forequarter shoulder roast	Lamb frenched cutlet/rack
Energy (kJ)	917	985	762	643
Protein (g)	16.1	21.3	17.6	19
Fat (g)	17.4	16.8	12.5	8.7
- Sat. (g)	5.3	7.1	4.8	3.4
- Mono. (g)	8.7	7.4	5.4	3.4
- Poly. (g)	2.3	0.5	1.6	0.7
- ALA C18:3w3 (mg)	0.18	0.12	0.1	0.1
- Long chain n-3 (mg)	16	58	54	102
- DHA C22:6w3 (mg)	7	2	28	11
- DPA C22:5w3 (mg)	7	15	14	58
- EPA C20:5w3 (mg)	2	41	0	33
Cholesterol (mg)	87	58	66	67
Carbohydrate (g)	0	0	0	0
Calcium (mg)	13	6	14	9
Iron (mg)	0.5	2	1.1	2
Magnesium (mg)	16	22	19	29
Phosphorus (mg)	157	194	182	223
Potassium (mg)	184	325	329	340
Selenium (ug)	11.7	10	12	10
Sodium (mg)	56	49	69	62
Zinc (mg)	0.9	3.1	2.3	2.8
Thiamin (mg)	0.04	0.04	0.59	0.12
Riboflavin (mg)	0.12	0.18	0.24	0.25
Niacin (mg)	5.5	6.7	3.5	6.6
Vitamin B6 (mg)	0.35	0.18	-	0.13
Biofin (ug)	2.1	-	4	1.7
Pantothenic acid (mg)	0.53	0.3	0.88	0.56
Retinol Equiv. (ug)	67	12	10	10
Vitamin E (mg)	0.5	0.9	0.1	0.5



Table 6: Recommended Dietary Intakes (RDI) and Daily Intake (DI) Reference Values for labelling purposes from Food Standards Australia New Zealand²⁰

DIs	
Energy	8700kJ
Protein	50g
Fat	70g
Saturated fat	24g
Carbohydrate	310g
Sodium	2300mg
RDIs	
Calcium	800mg
Iron	12mg
Magnesium	320mg
Phosphorous	1000mg
Selenium	70mcg
Zinc	12mg
Thiamin	1.1mg
Riboflavin	1.7mg
Niacin	10mg
Vitamin B6	1.6mg
Biotin	30mcg
Pantothenic acid	5mg
Vitamin A (retinol)	750mcg
Vitamin E	10mg
Omega-3, total long chain*	
- Men	160mg
- Women	90mg
Manganese**	5mg

*Adequate intake recommendations, NHMRC²

**ESADDI (estimated safe and adequate daily dietary intake)

Table 7: percentage contribution the various lean (skinless) chicken cuts make to daily intakes (DI's) and recommended dietary intakes (RDI's).

Per 100g	Whole chicken	% DI/ RDI	Chicken breast	% DI/ RDI	Chicken thigh	% DI/ RDI	Chicken drumstick	% DI/ RDI	Chicken wing	% DI/ RDI
Energy (kJ)	465	5%	438	5%	496	6%	492	6%	470	5%
Protein (g)	20.3	41%	22.3	45%	18.3	37%	18.5	37%	18.7	37%
Fat (g)	3.2	5%	1.6	2%	5	7%	4.8	7%	4.1	6%
- Sat. (g)	1.0	4%	0.5	2%	1.5	6%	1.4	6%	1.2	5%
- Mono. (g)	1.5	-	0.7	-	2.4	-	2.3	-	2	-
- Poly. (g)	0.5	-	0.3	-	0.8	-	0.8	-	0.7	-
- ALA C18:3w3 (mg)	0.028	-	0.01	-	0.05	-	0.04	-	0.04	-
- Long chain n-3 (mg)	25		23		24		32		27	
Male		16%		14%		15%		20%		17%
Female		28%		26%		27%		36%		30%
- DHA C22:6w3 (mg)	10.1	-	9	-	9	-	14	-	12	-
- DPA C22:5w3 (mg)	12.1	-	9	-	14	-	18	-	12	-
- EPA C20:5w3 (mg)	2.7	-	5	-	0	-	0	-	4	-
Cholesterol (mg)	70	-	59	-	79	-	84	-	79	-
Carbohydrate (g)	0	0%	0	0%	0	0%	0	0%	0	0%
Calcium (mg)	1	1%	12	2%	10	1%	10	1%	13	2%
Iron (mg)	0.48	4%	0.32	3%	0.7	6%	0.6	5%	0.4	3%
Magnesium (mg)	25	8%	28	9%	24	8%	22	7%	22	7%
Phosphorus (mg)	230	23%	250	25%	220	22%	200	20%	200	20%
Potassium (mg)	283	-	300	-	280	-	260	-	230	-
Selenium (ug)	22	32%	25	36%	20	29%	20	29%	20	29%
Sodium (mg)	54	2%	41	2%	62	3%	71	3%	66	3%
Zinc (mg)	1.1	9%	0.7	6%	1.5	13%	1.7	14%	1.1	9%
Thiamin (mg)	0.11	10%	0.11	10%	0.11	10%	0.14	13%	0.06	5%
Riboflavin (mg)	0.19	11%	0.19	11%	0.24	14%	0.13	8%	0.13	8%
Niacin (mg)	8.4	84%	11	110%	6.0	60%	5.0	50%	8.0	80%
Vitamin B6 (mg)	0.54	34%	0.76	48%	0.27	17%	0.33	21%	0.52	33%
Biotin (ug)	2.9	10%	2.1	7%	3.7	12%	3.9	13%	2.6	9%
Pantothenic acid (mg)	1.1	21%	1	20%	1.2	24%	1.1	22%	0.7	14%
Retinol Equiv. (ug)	14.4	-	8	-	19	-	16	-	37	-
Vitamin E (mg)	1.3	13%	2.2	22%	0.6	6%	0.3	3%	0.3	3%



Table 8 outlines the nutrients in whole chicken and the various cuts of chicken.

	Whole chicken	Breast	Thigh	Drumstick	Wing	Whole chicken	Breast	Thigh	Drumstick	Wing
Per 100g	Lean					Flesh + skin + fat				
Energy (kJ)	465.2	438	496	492	470	683.3	688	608	645	917
Protein (g)	20.31	22.3	18.3	18.5	18.7	18.42	20.1	17.5	17.6	16.1
Fat (g)	3.244	1.6	5	4.8	4.1	10.02	9.4	8.4	9.3	17.4
- Sat. (g)	0.974	0.5	1.5	1.4	1.2	3.043	2.9	2.5	2.8	5.3
- Mono. (g)	1.526	0.7	2.4	2.3	2	4.929	4.6	4.1	4.6	8.7
- Poly. (g)	0.549	0.3	0.8	0.8	0.7	1.404	1.3	1.2	1.4	2.3
- ALA C18:3w3 (mg)	0.028	0.01	0.05	0.04	0.04	0.083	0.09	0.08	0	0.18
- Long chain n-3 (mg)	25.14	23	24	32	27	20.89	19	22	27	16
- DHA C22:6w3 (mg)	10.1	9	9	14	12	8.44	7	9	12	7
- DPA C22:5w3 (mg)	12.12	9	14	18	12	10.33	7	13	16	7
- EPA C20:5w3 (mg)	2.726	5	0	0	4	1.876	4	0	0	2
Cholesterol (mg)	70.15	59	79	84	79	75.36	65	79	86	87
Carbohydrate (g)	0	0	0	0	0	0	0	0	0	0
Calcium (mg)	11.19	12	10	10	13	10.87	12	9	10	13
Iron (mg)	0.476	0.32	0.7	0.6	0.4	0.537	0.4	0.7	0.6	0.5
Magnesium (mg)	25.45	28	24	22	22	22.09	24	23	20	16
Phosphorus (mg)	229.6	250	220	200	200	202.7	217	210	186	157
Potassium (mg)	282.5	300	280	260	230	610.3	260	267	2420	184
Selenium (ug)	22.43	25	20	20	20	18.41	20.5	18.8	17.3	11.7
Sodium (mg)	53.66	41	62	71	66	52.08	39	60	67	56
Zinc (mg)	1.117	0.7	1.5	1.7	1.1	1.087	0.7	1.4	1.6	0.9
Thiamin (mg)	0.112	0.11	0.11	0.14	0.06	0.092	0.09	0.1	0.12	0.04
Riboflavin (mg)	0.188	0.19	0.24	0.13	0.13	0.185	0.17	0.26	0.13	0.12
Niacin (mg)	8.4	11.0	6.0	5.0	8.0	7.0	9.3	5.8	4.6	5.5
Vitamin B6 (mg)	0.537	0.76	0.27	0.33	0.52	0.433	0.64	0.26	0.3	0.35
Biotin (ug)	2.876	2.1	3.7	3.9	2.6	2.767	2	3.6	3.6	2.1
Pantothenic acid (mg)	1.048	1	1.2	1.1	0.7	0.936	0.87	1.15	0.99	0.53
Retinol Equiv. (ug)	14.44	8	19	16	37	29.38	22	25	29	67
Vitamin E (mg)	1.304	2.2	0.6	0.3	0.3	1.088	1.9	0.6	0.4	0.5



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Chicken

