

NOVEMBER 2022

Sheep reproduction RD&A alert

This sheep reproduction RD&A alert is an initiative of the Sheep Reproduction Strategic Partnership (SRSP).

MLA recently commissioned [a global review of adoption practices and outcomes](#). The review aimed to identify successful novel strategies, programs, and practices that could be implemented to support the continuous improvement of approaches for adoption in the Australian red meat sector. The key project output was to provide recommendations for strengthening producer engagement adoption programs, to enable practice change on-farm.

The review revealed that designing effective programs for behavioural and practice change relies on a comprehensive stakeholder analysis and engagement to get the 'right people in the room', skilled facilitators to support peer learning, leadership and group processes, building and maintaining social networks across supply chains and professions for knowledge generation and exchange, having a flexible approach to the adoption program so that it can adapt to changing conditions, and lesson learned, as well as appropriate resourcing (financial, people and time).

Integration and implementation of the review's findings into producer adoption programs are likely to:

- Increase engagement of producers and increased adoption, thereby creating more value from the investment to support change.
- Lead to greater engagement of advisory networks in MLA adoption programs and increased capability of existing and new advisors.
- Increase the demand for new and existing products targeted to meet producer and industry needs, which will increase the uptake of outputs from existing R&D projects and focus the development of outputs from new or ongoing R&D investments.

The SRSP aims to help sheep producers to profitability and sustainably increase lamb production through increasing lamb survival and weaning rates and will coordinate a national approach to improving sheep reproductive performance.

Program coordinator

Dr Sue Hatcher

M: 0407 006 454

E: sue@makinoutcomes.com.au

Feature project update

Optimal supplementary feeding strategies for lamb survival

Optimising ewe nutrition during pregnancy and lactation is vital for improving lamb survival. Supplementary feeding is often required to meet the nutritional demands of ewes lambing in autumn and when feed-on-offer is limited during winter or early spring. Anecdotal reports have suggested that supplementary feeding ewes at lambing may cause them to abandon their lambs which could reduce lamb survival. Despite this, little research has been undertaken to investigate optimal supplementary feeding strategies (i.e. trail feeding or self-feeders) for lambing ewes.

This project aims to evaluate various methods for trail feeding and self-feeders at lambing and quantify the impacts on lamb survival to marking on commercial farms across southern Australia. The project will also assess changes in mob behaviour associated with the feeding method using sensor and/or other remote technology.

Project objectives

1. Quantify the effects of supplementary feeding ewes during lambing using self-feeders or trail feeding on ewe behaviour and lamb survival to marking and undertake a detailed benefit cost analysis of each feeding strategy.
2. Develop guidelines for supplementary feeding ewes during lambing for extension to producers via existing networks along with extension programs.

Current progress

Ten on-farm research sites (2 in WA, 6 in Victoria and 2 in NSW) have completed the initial stage of the project and supplementary fed their single and twin-bearing ewes via self-feeders or by trail feeding during lambing in 2021 or 2022. Four of these sites have deployed remote monitoring devices on the lambing ewes to capture information on ewe behaviour when supplementary fed via self-feeders or trail feeding.

The project team have had some difficulty in recruiting on-farm research sites to participate in this project. Any producers interested in taking part in this project during 2023 should contact Dr Amy Lockwood (a.lockwood@murdoch.edu.au) or Dr Serina Hancock (s.hancock@murdoch.edu.au) to discuss the project requirements and data collection protocols.

Review papers

Perspective: Re-defining “Pheromone” in a mammalian context to encompass seminal fluid

Sarah A. Robertson and Graeme B. Martin (graeme.martin@uwa.edu.au)

Frontiers in Veterinary Science, Volume 8, 20 January 2022 **OPEN ACCESS**

DOI <https://doi.org/10.3389/fvets.2021.819246>

Abstract

The classical view of “pheromone”—an air-borne chemical signal—is challenged by the camelids in which ovulation is triggered by β -nerve growth factor carried in seminal plasma, effectively extending the pheromone concept to a new medium. We propose further extension of “pheromone” to include a separate class of seminal fluid molecules that acts on the female reproductive tract to enhance the prospect of pregnancy. These molecules include transforming growth factor- β , 19-OH prostaglandins, various ligands of Toll-like receptor-4 (TLR4), and cyclic ADP ribose hydrolase (CD38). They modulate the immune response to “foreign” male-derived histocompatibility antigens on both sperm and the conceptus, determine pre-implantation embryo development, and then promote implantation by increasing uterine receptivity to the embryo. The relative abundance of these immunological molecules in seminal plasma determines the strength and quality of the immune tolerance that is generated in the female. This phenomenon has profound implications in reproductive biology because it provides a pathway, independent of the fertilizing sperm, by which paternal factors can influence the likelihood of reproductive success, as well as the phenotype and health status of offspring. Moreover, the female actively participates in this exchange—information in seminal fluid is subject to “cryptic female choice,” a process by which females interrogate the reproductive fitness of prospective mates and invest reproductive resources accordingly. These processes participate in driving the evolution of male accessory glands, ensuring optimal female reproductive investment and maximal progeny fitness. An expanded pheromone concept will avoid a constraint in our understanding of mammalian reproductive biology.

Breeding ewe lambs: an Australasian perspective

Paul R. Kenyon (p.r.kenyon@massey.ac.nz) and Rene A. Corner-Thomas

Animals, Volume 12(12), November 2022 **OPEN ACCESS**

DOI <https://doi.org/10.3390/ani12223207>

Simple Summary

There are a number of potential advantages and disadvantages associated with breeding ewe lambs at 7 to 9 months of age. In extensive pastoral systems, such as those in Australia and New Zealand, a relatively low percentage of ewe lambs are bred, which suggests that the decision to breed ewe lambs is based on the perception that the potential advantages outweigh the disadvantages. This review outlines current knowledge of ewe lamb breeding with a focus on more recent Australasian studies, particularly relating to factors that influence breeding success. Differences in reproductive success of ewe lambs and mature ewes are highlighted to help identify where differences occur. Furthermore, management guidelines beginning from the weaning of the young ewe herself, through her first breeding, post-weaning of her first set of lambs, and to her second breeding are outlined. Of particular importance is ensuring that ewe lamb live weight and/or body condition score targets at breeding at 7 to 9 months of age are met and appropriate feeding guidelines are followed throughout pregnancy. Adherence to these guidelines should ensure that reproductive success is high and that the potential disadvantages of breeding ewe lambs are mitigated. The potential long-term effects of breeding ewe lambs are also outlined. The review highlights where knowledge is lacking, with a particular focus on Australasian production systems, and where further research is required.

Abstract

A number of potential advantages have been identified for breeding ewe lambs at 7 to 9 months of age, including increased lifetime productivity and profitability. However, breeding at this young age in extensive pastoral systems, such as in Australasia, can be associated with a number of disadvantages resulting in uptake of this management procedure being relatively low. This review highlights the known differences between ewe lamb and mature ewe reproductive performance, thus differing in their management. The review then summarises the scientific literature of factors that affect ewe lamb reproductive success, with a focus on recent studies conducted under extensive pasture-based conditions in Australasia. In particular, this review outlines the importance of ewe lamb live weight and body condition score on their productivity. The potential long-term consequences of breeding a ewe lamb at a young age in terms of her future success and that of her offspring to weaning are briefly outlined. In addition, the potential impacts of selecting progeny born to ewe lambs as future replacement ewes are discussed. Throughout this review, optimal management guidelines from prior to breeding the ewe lambs until rebreeding at 2 years of age are provided. Lastly, areas requiring future research are identified and discussed.

Scientific papers

Impact of breeding for reduced methane emissions in New Zealand sheep on maternal and health traits

Sharon M. Hickey, Wendy E. Bain, Timothy P. Bilton, Gordon J. Greer, Sara Elmes, Brooke Bryson, Cesar S. Pinares-Patiño, Janine Wing, Arjan Jonker, Emily A. Young, Kevin Knowler, Natalie K. Pickering, Ken G. Dodds, Peter H. Janssen, John C. McEwan and Suzanne J. Rowe (suzanne.rowe@agresearch.co.nz)

Frontiers in Genetics, 13:910413 **OPEN ACCESS**

DOI <https://doi.org/10.3389/fgene.2022.910413>

Abstract

Enteric methane emissions from ruminants account for ~35% of New Zealand's greenhouse gas emissions. This poses a significant threat to the pastoral sector. Breeding has been shown to successfully lower methane emissions, and genomic prediction for lowered methane emissions has been introduced at the national level. The long-term genetic impacts of including low methane in ruminant breeding programs, however, are unknown. The success of the New Zealand sheep industry is currently heavily reliant on the prolificacy, fecundity and survival of adult ewes. The objective of this study was to determine genetic and phenotypic correlations between adult maternal ewe traits (live weight, body condition score, number of lambs born, litter survival to weaning, pregnancy scanning and fleece weight), faecal and Nematodirus egg counts and measures of methane in respiration chambers. More than 9,000 records for methane from over 2,200 sheep measured in respiration chambers were collected over 10 years. Sheep were fed on a restricted diet calculated as approximately twice the maintenance. Methane measures were converted to absolute daily emissions of methane measured in g per day (CH₄/day). Two measures of methane yield were recorded: the ratio of CH₄ to dry matter intake (g CH₄/kg DMI; CH₄/DMI) and the ratio of CH₄ to total gas emissions (CH₄/(CH₄ + CO₂)). Ewes were maintained in the flocks for at least two parities. Non-methane trait data from over 8,000 female relatives were collated to estimate genetic correlations. Results suggest that breeding for low CH₄/DMI is unlikely to negatively affect faecal egg counts, adult ewe fertility and litter survival traits, with no evidence for significant genetic correlations. Fleece weight was unfavourably (favourably) correlated with CH₄/DMI ($r_g = -0.21 \pm 0.09$). Live weight ($r_g = 0.3 \pm 0.1$) and body condition score ($r_g = 0.2 \pm 0.1$) were positively correlated with methane yield. Comparing the two estimates of methane yield, CH₄/DMI had lower heritability and repeatability. However, correlations of both measures with adult ewe traits were similar. This suggests that breeding is a suitable mitigation strategy for lowering methane yield, but wool, live weight and fat deposition traits may be affected over time and should be monitored.

Injectable progesterone for estrus and ovulation induction in seasonal anestrus ewes

Camila Amaral D'Avila, Fabiane Pereira de Moraes, Andrez Pastorello Bohn, Monique Tomazele Rovani, Arnaldo Diniz Vieira, Rogério Ferreira, José Nélio de Sousa Sales, Hernan Baldassarre, Rafael Gianella Mondadori, Paulo Bayard Dias Gonçalves and Bernardo Garziera Gasperin (bernardo.gasperin@ufpel.edu.br)

Livestock Science, Volume 265, November 2022

DOI <https://doi.org/10.1016/j.livsci.2022.105070>

Highlights

- A serum concentration curve after administration of long-acting injectable progesterone in anestrus ewes was determined.
- Injectable P4 allowed serum concentration above 1 ng/mL for at least 4 and 7 days.
- Injectable P4 prior to cyclicity induction did not improve the outcome.
- Injectable P4 associated to eCG induced ovulations, without estrus manifestation.

Abstract

We evaluated, for the first time, the effects of long-acting injectable progesterone (iP4) for estrus induction in ewes during non-breeding season. To evaluate the serum progesterone (P4) curve induced by the application of iP4 in sheep and the effect of its use prior to the cyclicity induction protocol, for Experiment 1, 39 ewes were allocated into three groups: no-treatment, control (n = 14); 37.5 mg of iP4 im (iP4 37.5, n = 13), and 75 mg of iP4 im (iP4 75, n = 12). P4 dosage in a subset of animals (5 per group) showed the highest P4 level at 48 h and reduction to basal levels 10 days after injection, when all females received an intravaginal device (IVD) containing 60 mg of medroxyprogesterone acetate (MPA) that remained for 11 days. At withdrawal the animals received 400 IU of eCG im, and rams remained for three days with ewes. On days 6

and 12 after IVD removal, blood samples were collected from a subset (n = 5 per group) of ewes that manifested estrous. iP4 75 group had lower luteal P4 concentration, and lower conception rate (35 days after mating) when compared to the other groups. To evaluate the possibility of replacing IVD with iP4, on experiment 2, 36 ewes were allocated into two treatments: control (n = 10), IVD for nine days and 300 IU of eCG at withdrawal; and iP4 75 (n = 26) 75 mg of iP4 im and, after 9 (n = 13) or 10 (n = 13) days, animals were injected with 300 IU of eCG. Estrus manifestation and conception rates were lower in groups treated with iP4. Eleven days after estrus, 93.3% of a subset of animals (5 from control and 10 from iP4 75) exhibited P4 concentrations above 1 ng/mL, indicating ovulations. In conclusion, the injection of 75 mg of long acting iP4 maintained levels above 1 ng/mL for at least 7 days, and negatively affected P4 luteal concentration and conception rate after a subsequent cyclicity induction protocol. Treatment with 75 mg of iP4 associated to eCG is suitable for inducing ovulations, although inhibits estrus manifestation.

Determination of ewe behaviour around lambing time and prediction of parturition 7 days prior to lambing by tri-axial accelerometer sensors in an extensive farming system

Rajneet Sohi (r.sohi@latrobe.edu.au) , Fazel Almasi, Hien Nguyen, Alexandra Carroll, Jason Trompf, Maneka Weerasinghe, Aidin Bervan, Boris I. Godoy, Awais Ahmed, Michael J. Stear, Aniruddha Desai and Markandeya Jois

Animal Production Science, Volume 62(17), November 2022

DOI <https://doi.org/10.1071/AN21460>

Abstract

Context: Lamb loss and dystocia are two major challenges in extensive farming systems. While visual observation can be impractical due to the large sizes of paddocks, number of animals and high labour cost, wearable sensors can be used to monitor the behaviour of ewes as there might be changes in their activities prior to lambing. This provides sufficient time for the farm manager to nurse those ewes that are at risk of dystocia.

Aim: The objective of this study was to determine whether the behaviour of a pregnant ewe could predict the time of parturition.

Methods: Two separate trials were conducted: the first trial (T1), with 32 ewes, included human/video observations, and the second trial (T2), with 165 ewes, conducted with no humans present, to emulate real extensive farming settings. The ewes were fitted with tri-axial accelerometer sensors by means of halters. Three-dimensional movement data were collected for a period of at least 7 and 14 days in T1 and T2 respectively. The sensor units were retrieved, and their data downloaded using ActiGraph software. Ewe behaviour was determined through support vector machine learning (SVM) algorithm, including licking, grazing, rumination, walking, and idling. The behaviours of ewes predicted by analysis of sensor data were compared with behaviours determined using visual observation (video recordings), with time synchronisation to validate the results. Deep learning and neural-network algorithms were used to predict lambing time.

Key results: The concordance percentages between visual observation and sensor data were 90 ± 11 , 81 ± 15 , 95 ± 10 , 96 ± 6 , and $93 \pm 8\% \pm$ s.d. for grazing, licking, rumination, idling, and walking respectively. The deep-learning model predicted the time of lambing with 90% confidence via a quantile regression method, which can be interpreted as 90% prediction intervals, and shows that the time of lambing can be predicted with reasonable confidence approximately 240 h before the actual lambing events.

Conclusion: It was possible to predict the time of parturition up to 10 days before lambing.

Heritability and genetic parameters for semen traits in Australian sheep

Marnie J. Hodge, Sally J. Rindfleish, Sara de las Heras-Saldana, Cyril P. Stephen and Sameer D. Pant
(spant@csu.edu.au)

Animals Volume 12(21) November 2022 **OPEN ACCESS**

DOI <https://doi.org/10.3390/ani12212946>

Simple Summary

Semen traits associated with ejaculate volume, gross motility, concentration, and percent post-thaw motility are crucial determinants of successful reproduction, which, in turn, can influence the profitability of seedstock and commercial sheep enterprises. Previous studies in cattle, where artificial insemination is also widely used, have reported declining trends in ejaculate traits. Such a trend, if observed in sheep, could negatively impact conception outcomes, and contribute to reduced reproductive efficiency. Selective breeding to improve ejaculate traits could provide a means to ensure continued efficiency in ovine reproduction. Therefore, the objective of this study was to estimate heritability and genetic correlations between four routinely assessed ejaculate quality and quantity traits in sheep breeds commonly farmed in Australia. An analysis of ejaculate traits collected over 20 years indicated that all ejaculate quality and quantity traits were lowly heritable (0.081–0.17), with gross motility and volume having relatively higher heritability estimates compared to concentration and percent post-thaw motility. Overall, the results indicate that ejaculate quality and quantity could potentially be improved via selective breeding.

Abstract

Semen characteristics including volume, gross motility, spermatozoal concentration, and percent post-thaw motility are routinely assessed to determine the quality and quantity of an ejaculate prior to use in artificial breeding programs. Currently, artificial breeding programs in sheep place relatively little emphasis on ram-side factors, such as the fertilising potential of an ejaculate, which may contribute to variability in conception outcomes. Estimating genetic parameters for ejaculate quality and quantity traits could provide insights into whether selective breeding can be used to improve such ram-side traits, improving ovine reproductive performance and farm profitability. Therefore, in this study, a total of 11,470 ejaculate records, including data for ejaculate volume, gross motility, spermatozoal concentration, and percent post-thaw motility, collected over a 20-year period was used to estimate genetic parameters in sheep. Univariate and bivariate mixed model analysis was performed including a variety of fixed effects such as breed, age at collection, centre of collection, collection number, season of collection, and method of collection; and the permanent environmental effects associated with each ram, stud and year of collection, and the breeding value of rams included as random effects. The heritability for ejaculate volume, gross motility, concentration, and percent post-thaw motility was estimated to be 0.161, 0.170, 0.089, and 0.081. Repeatability estimates were moderate, ranging between 0.4126 and 0.5265. Overall, results indicate that semen traits are lowly heritable and moderately repeatable, indicating that these traits are significantly influenced by environmental variables.

Mating conditions and management practices influence pregnancy scanning outcomes differently between ewe breeds

Amy L. Bates (abates@csu.edu.au), Shawn R. McGrath, Susan M. Robertson and Gordon Refshauge

Animals Volume 12(21) November 2022 **OPEN ACCESS**

DOI <https://doi.org/10.3390/ani12212908>

Simple Summary

The conditions and management practices imposed during mating can influence the success of a sheep production enterprise. However, the impact of mating practices across southern Australian sheep production

systems are relatively unknown. Mating liveweight and body condition score data were collected at mating from four sheep breeds and during three seasons of mating across southern Australia. Further, the seasonal conditions during mating were ranked by the producers and ram percentage and region were also recorded. Bayesian Network analysis was used to explore the relationships between these variables and pregnancy and fetal number at scanning. The results of this survey study emphasize the interrelatedness of the explored mating conditions and practices and the importance of understanding their interactions for optimizing sheep reproduction and nutrition from mating.

Abstract

Sheep production in southern Australia may vary by breed, time of year, production output (wool, meat, or both), region and seasonal influence. Sheep producers with flocks of approximately 300–500 ewes (n = 58) were recruited across southern Australia to take part in a survey and mating variables were collected from over 30,000 ewes between October 2020 and August 2021. A Bayesian Network (BN) was developed to identify the interrelatedness and most influential variable on pregnancy and fetal number (of pregnant ewes) outcomes under different scenarios. The BN analysis indicated a low association between the variables explored, however, were breed dependent. In wool-based breeds a mating liveweight of 60–69.5 kg predicted the lowest non-pregnant and greatest number of fetuses, and in shedding ewes 70–79.5 kg predicted the lowest non-pregnant rate and 90–99.5 kg the greatest number of fetuses. Pregnancy rate and fetuses per ewe were optimized at ram percentages of 1.5% for Composite and Merino ewes and 2% for Maternal ewes. A mating BCS 4 resulted in greatest pregnancy rate and number of fetuses across all breeds. Curvilinear relationships between mating liveweight, BCS and ram percentage were observed with pregnancy rate and fetal number. Practically, reproductive potential is best managed on a breed basis and with consideration of all variables explored.

MLA Project L.LSM.0020 *Refining body condition score for region, season, breed and responsiveness*

GnRH administration after estrus induction protocol decreases the pregnancy rate of recipient ewes following transfer of frozen-thawed embryos

Jing Zhang, Xinglong Wu and Xiangyun Li (Lxyun@hebau.edu.cn)

Small Ruminant Research, Volume 217, December 2022

DOI <https://doi.org/10.1016/j.smallrumres.2022.106849>

Highlights

- GnRH administration 48 h after sponge removal improved the presence of corpus luteum of recipient ewes.
- GnRH decreased the pregnancy rate of recipient ewes following embryo transfer.
- GnRH decreased the embryo survival rate of recipient ewes following embryo transfer.

Abstract

The objective of this study was to investigate the effects of GnRH on the pregnancy rate and the embryo survival rate of recipient ewes following embryo transfer. Estrus was synchronized in 83 nulliparous Huyang ewes using intravaginal sponges impregnated with 45 mg flurogestone acetate. The sponge was left in the vagina for 12 days followed with an injection of 330 IU of eCG at sponge removal. The treatment group (n = 34) was subjected 48 h after sponge removal to intramuscular administration with 16 µg of the GnRH agonist triptorelin and the control group (n = 49) with 1 mL of saline solution. Embryo transfer was performed by laparoscopy on day 8 after sponge removal, which transferred frozen-thawed embryos of Suffolk ewes directly to the anterior third of the corpus luteum ipsilateral uterine horn of the recipient ewe. Each recipient with at least one normal corpus luteum received one grade I embryo. The proportion of ewes with at least one normal corpus luteum in the control group was significantly lower compared to the treatment group

(73.5 % vs 91.2 %, $P < 0.05$). In total, 62 embryos were transferred into 62 ewes and 29 lambs were born. The pregnancy rate (59.4 % vs 33.3 %, $P < 0.05$) and the embryo survival rate (56.3 % vs 30.0 %, $P < 0.05$) in the control group were significantly higher compared to the treatment group. In conclusion, a single dose of GnRH administered 48 h after sponge removal significantly decreased the pregnancy rate and the embryo survival rate of recipient ewes following transfer of frozen-thawed embryos.

Calcium and magnesium supplementation of ewes grazing pasture did not improve lamb survival

Susan M. Robertson (surobertson@csu.edu.au), Shawn R. McGrath, Samuel Scarlett, Marie Bhanugopan, Janelle E. Hocking Edwards, Emma Winslow, Serina Hancock, Andrew N. Thompson, Gordon Refshauge and Michael A. Friend

Animal Production Science, Volume 62(18), 1 December 2022 **OPEN ACCESS**

DOI <https://doi.org/10.1071/AN22113>

Abstract

Context: Clinical deficiencies of calcium and magnesium may result in the metabolic disorders hypocalcaemia and hypomagnesaemia, resulting in ewe and lamb mortality. However, the contribution of subclinical deficiencies to perinatal lamb mortality in grazing flocks is unclear.

Aims: To test the hypothesis that calcium and magnesium supplementation during the lambing period would increase lamb survival to marking age.

Methods: In 2017, an on-farm study used five flocks across New South Wales, South Australia and Western Australia. On each farm, twin-bearing mature Merino ewes ($n = 400\text{--}600$) grazing pasture were allocated to two replicates of control and supplemented treatments. The supplemented groups were offered 30 g/ewe per day of a loose lick containing magnesium chloride ($\text{MgCl}_2(\text{H}_2\text{O})_6$), calcium sulfate ($\text{CaSO}_4 \cdot (\text{H}_2\text{O})_2$), and salt (NaCl), in the ratio 12.5:32.5:55.0, designed to have a low dietary cation–anion difference (-390 meq/100 g). A second study was conducted in 2018 on one farm to test the form of supplement. This study used two replicates of three treatments: control; a low-dietary cation–anion difference supplement as used in 2017; and a standard lime, Causmag (calcined MgO) and salt loose mix (ratio 1:1:1). Mature twin-bearing composite ewes ($n = 600$) were allocated to groups and those supplemented were offered minerals for the last month of pregnancy and during the lambing period. Blood and urine samples were collected in both experiments for analyses of mineral concentrations.

Key results: In the 2017 study, only two flocks consumed >10 g/ewe of supplement per day, and supplementation did not increase lamb survival to marking age in these flocks. In the 2018 study, the mean consumption of supplement was 18 or 20 g/ewe per day. Of non-supplemented ewes, 61% were deficient in plasma calcium (≤ 90 mg/L) and 17% were deficient in magnesium (≤ 18 mg/L) at Day 140 after the start of joining. Lamb survival was not increased by supplementation and was $77 \pm 3.8\%$ in both treatments.

Conclusions: Calcium and magnesium supplementation did not increase lamb survival.

Implications: Lamb survival was not increased by calcium and magnesium supplementation; however, evaluation under a wider range of grazing conditions with adequate supplement intake is required.

Upcoming events

Date	Event	Location
8 December 2022	Are your bugs bogging you down?	Webinar

Sheep Connect NSW